Integrated Management Plan

and

Groundwater Management Plan

Revised

Rules

and

Regulations

for the

LOWER NIOBRARA

NATURAL RESOURCES DISTRICT

February 12, 2015

Groundwater Management Plan

Original Adopted August 11, 1986

Revised May, 1992

Revised July 1, 1996

Revised December 12, 2005

Revised September 3, 2009

Revised September 14, 2011

Revised April 4, 2014

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1. AUTHORITY & PURPOSE OF THESE RULES & REGULATIONS

1.1. The Lower Niobrara Natural Resources District shall adopt and promulgate, in accordance with The Nebraska Groundwater Management and Protection Act, such rules and regulations as are necessary to the discharge of duties assigned to the District by The Groundwater Management and Protection Act (Act), Neb. Rev. Stat. §§46-701-46-754, and the Lower Niobrara Natural Resources District (District) and the Nebraska Department of Natural Resources (Department) Voluntary Integrated Management Plan (IMP) as adopted May 1, 2014, (Appendix 2; IMP Goals, Objectives and Action Items) and subsequently amended as necessary by the District and the Department.

1.2. Groundwater is owned by the public and the only right held by an overlying landowner is in the reasonable and beneficial use of the groundwater underlying his or her land subject to the provisions of the Act, Neb. Rev. Stat. §46-702, and the correlative rights of other landowners when the groundwater is insufficient to meet the reasonable needs of all users. The District is responsible for the management of the groundwater within the District, Neb. Rev. Stat. §46-703 (4).

1.3. The District Board of Directors (Board) adopted these Rules and Regulations after a Public Hearing, February 27, 2014.

2. APPLICATION OF THESE RULES AND REGULATIONS

2.1. These Rules and Regulations apply to matters of groundwater quality, groundwater quantity and prevention or resolution of conflicts between users of hydrologically connected groundwater and surface water, within the entire area defined by the geographical boundaries of the District, Appendix 1,in accordance with Neb. Rev. Stat. §46-707.

2.2. Preference in the use of groundwater shall be given to those using the water for domestic purposes. They shall have preference over those claiming it for any other purpose. Those using the water for agricultural purposes shall have preference over those using the same for manufacturing or industrial purposes. As used in this rule; a.) Domestic use of groundwater shall mean all uses of groundwater for human needs as it relates to health, fire control, and sanitation and shall include the use of groundwater for domestic livestock as related to normal farm and ranch operations; and b.) Agricultural purposes shall include, but not be limited to, aquaculture purposes in accordance with Neb. Rev. Stat. §46-613.

2.3. Neb. Rev. Stat §§46-703 and 704(3) provides the District significant legal authority to regulate activities within its boundaries in a way that ensures agriculture remains an important industry to the State of Nebraska. The District's Groundwater Management Plan, revisions 12-13-2005, 09-03-2009, 10-14-2011 and as subsequently adopted by amendment by the Lower Niobrara Natural Resources District Board of Directors, remains effective in accordance with Neb. Rev. Stat §46-709.

3. DEFINITIONS

3.1. Acre-inch shall mean the amount of water necessary to cover an acre of land one inch deep.

3.2. Act shall mean the Nebraska Ground Water Management and Protection Act, Neb. Rev. Stat. §§46-701-46-754 as amended.

3.3. Agricultural Transfers: means, but is not limited to, the transfer of groundwater to be used in the production of crops, livestock or aquaculture purposes in accordance with Neb. Rev. Stat. §46-613.

3.4. Alleged Violator shall mean any person against which a complaint has been filed in accordance with Rule 5.

3.5. Allocation shall mean the allotment of a specified total number of acre-inches of irrigation water per irrigated acre per year or an average number of acre-inches of irrigation water per irrigated acre over any reasonable period of time not to exceed five years.
3.6. Best Management Practices shall mean schedules of activities, maintenance procedures, and other management practices utilized to prevent or reduce present and future contamination of groundwater which may include irrigation scheduling, proper rate and timing of fertilizer application, and other fertilizer and pesticide management programs. In determining the rate of fertilizer application, the District shall consult with the University of Nebraska or a certified crop advisor certified by the American Society of Agronomy.
3.7. Board or Board of Directors shall mean the Board of Directors of the Lower Niobrara Natural Resources District and/or its employees and agents acting at the direction of the Board of Directors.
3.8. Certification shall mean a current certificate of completion issued by the District to the operator for completion of the necessary educational programs outlined by the District.
3.9. Certified Operator shall mean the person or persons responsible for making decisions on any type of applications of nitrogen fertilizer on an area greater than one acre and applying more than 50 pounds per acre of actual nitrogen fertilizer on any agricultural land within the District, either commercially or privately, who must be certified by the District once every four years by attending and participating in a Nitrogen Management Certification class given by the District or by neighboring Natural Resources Districts.
3.10. Certified Irrigated Acre means any acre of land for which the landowner has provided District approved documentation and which has been approved by the Board for the application of groundwater.
3.11. Commingling Water shall mean two (2) or more groundwater wells that are commingled, combined, clustered, or joined and shall be considered for the purpose of these Rules and Regulations as one (1) water well. Other than a water source used to water range livestock, the combined capacity of commingled water wells shall require a water well construction permit pursuant to these Rules and Regulations and shall be subject to the same Rules and Regulations as any water well located within the District.
3.12. Common Carrier means any carrier of water including a pipe, canal, ditch, or other means of piping or adjoining water for irrigation purposes.
3.13. Complainant shall mean any person who files a complaint alleging a violation of these Rules and Regulations in accordance with Rule 6.
3.14. Compliance Officer shall mean an employee, agent, or director of the District authorized to perform the functions assigned thereto by these Rules and Regulations.
3.15. Contamination or Contamination of Groundwater shall mean nitrate-nitrogen or other material which enters the groundwater due to the action of any person and causes degradation of the quality of the groundwater sufficient to make such groundwater unsuitable for present or reasonably foreseeable beneficial uses.
3.16. Controls means any requirement, obligation, duty, or restriction placed upon a landowner and/or operator of the land by these Rules and Regulations.
3.17. Department, NDNR, or DNR means the Nebraska Department of Natural Resources.
3.18. Dewatering Well means a water well constructed for the purpose of lowering the groundwater surface elevation, either temporarily or permanently.
3.19. District shall mean the Lower Niobrara Natural Resources District.

3.20. Educational Programs shall mean information and educational training sessions designed to acquaint landowners and operators with Best Management Practices in the operation of their irrigation and cropping systems.
3.21. Field Boundaries shall mean the area which is certified with the District.
3.22. Flow meter or Flowmeter shall mean a measuring device, approved by the District, to measure the quantity of water pumped, withdrawn, or taken from a groundwater well, common carrier, and/or surface water source.
3.23. Good Cause Shown shall mean a reasonable justification for granting a variance that would otherwise be prohibited by law, statute, rule or regulation in which the Board reasonably and in good faith believes will provide an economic, environmental, social or public health and safety benefit that is equal to or greater than the benefit resulting from the prohibition in which a variance is sought
3.24. Groundwater shall mean water which occurs in or moves, seeps, filters, or percolates through ground under the surface of the land.
3.25. Groundwater Reservoir Life Goal shall be the goal of the District to provide an adequate supply of acceptable quality groundwater to forever fulfill the reasonable groundwater demands within the District for domestic, municipal, agricultural, industrial, wildlife, and other uses deemed beneficial by the District's Board of Directors.
3.26. Groundwater User shall mean a person who at any time extracts, withdraws, or confines groundwater for any use by himself/herself or allows such use by other persons at a rate in excess of 50 gallons per minute. Whenever the landowner and operator are different, the term "groundwater user" shall mean both the landowner and the operator.
3.27. Gross System Capacity or gallons per minute per acre is a method developed by the University of Nebraska to determine if an irrigation system has sufficient capacity by soil type to meet a crops need during the growing season. http://cropwatch.unl.edu/archive/-/asset_publisher/VHeSpfv0Agju/content/4913602 or Neb Guide G1851
3.28. Helper Well, Supplemental Well, Combined Wells shall mean any water well or wells that is used in conjunction with other irrigation well(s) and is used for the purpose of supplementing the rate of withdrawal, in gallons per minute, of the irrigation well or series of irrigation wells without increasing the number of acres irrigated.
3.29. High Capacity Livestock Well means a well or commingled wells with pumping capacity of over 50 gallons per minute that is used for the watering of livestock and other uses of water directly related to the operation of a feedlot or other confined livestock or dairy operation.
3.30. Illegal Water Well shall mean a.) Any water well operated or constructed without or in violation of a permit required by the act; b.) Any water well not in compliance with rules and regulations adopted and promulgated pursuant to the Act; c.) Any water well not properly registered in accordance with Neb. Rev. Stat. §§ 46-602 to 46-604; or d.) Any water well not in compliance with any other applicable laws of the State of Nebraska or with rules and regulations promulgated pursuant to such laws.
3.31. Improper Irrigation Run-off shall mean the occurrence of irrigation run-off water after January 1, 1977: a.) Which causes or contributes to the accumulation of water upon or beneath the surface of the lands of any other person(s) to their detriment; or b.) Which causes or contributes to the deterioration of water quality by depositing sediment and/or associated chemicals in surface waters within the area.

3.32. Inspector shall mean an employee, agent, or director of the District authorized to perform the functions assigned thereto by these Rules and Regulations.
3.33. Irrigated Acre shall mean any acre that is certified as such pursuant to Rules and Regulations of the District and that is actually capable of being supplied water through irrigation works, mechanisms, or facilities existing at the time of the allocation.
3.34. Irrigation Run-off Water shall mean groundwater used for irrigation purposes, which escapes from land owned, leased, or otherwise under the direct supervision and control of a groundwater user.
3.35. Lagoon Water shall mean water, not considered groundwater or surface water, that is part of a manure waste system that stores effluent from livestock, municipal, commercial or industrial facilities to be used to provide nutrients and water to crops.
3.36. Landowner shall mean any person who owns or is in the process of purchasing land.
3.37. Late Permit shall mean any permit received by the District after the construction has begun or completed.
3.38. Livestock Facilities means: a.) Livestock kept in buildings, lots or pens, which normally are not used for the growing of crops or vegetation; b.) Any livestock kept in any livestock facility that is required by the Livestock Waste Management Act or state livestock waste regulations to obtain a permit from the Department of Environmental Quality; or c.) Livestock which are confined for more than ninety (90) days per year. Livestock operation shall not mean livestock that are kept in pastures, on rangeland, or on other grazing lands and allowed to feed on vegetation growing therein.
3.39. Management Area shall mean all areas within the Lower Niobrara Natural Resources District as designated by the District pursuant to Neb. Rev. Stat. §§ 46-712 or 46-718, any area designated by the Director of Environmental Quality pursuant to Section 46-725, or any area designated by the Interrelated Water Review Board pursuant to Neb. Rev. Stat. § 46-719. Management area includes a control area or a special groundwater quality protection area designated prior to July 19, 1996.
3.40. Management Plan shall mean a Groundwater Management Plan developed by a District and submitted to the Director of Nebraska Department of Natural Resources or its predecessor, The Department for review pursuant to Neb. Rev. Stat. §§46-656.12-656.15. Neb. Rev. Stat. §§ 46-656.12 to 46-656.15.
3.41. Maximum Contaminant Level or MCL shall mean the maximum permissible level of a contaminant in water, which is deliverable to any user of public or private water system as established by the Environmental Protection Agency (EPA). The MCL represents a level of a contaminant beyond which serious health problems have occurred or can occur.
3.42. New Groundwater Irrigated Acre shall mean an acre that is not certified to be irrigated or not off-set and is allowed to be irrigated by the variance process causing a new net depletion to the basin.
3.43. Nitrate-Nitrogen Concentration in Groundwater means the amount of nitrate in groundwater expressed in units of mg/L NO_3-N. The unit NO_3-N simply is nitrogen which is in the form of nitrate.
3.44. Nitrate-Nitrogen Concentration in Nitrogen Fertilizer represents the amount of nitrate nitrogen which is available to the crop, which also referred to as actual nitrogen.
3.45. Nitrogen Fertilizer means a livestock waste or chemical compound in which the percentage of nitrate-nitrogen is greater than the percentage of any other nutrient in the compound or, when applied, results in an average application rate of more than fifty (50) pounds of nitrate-nitrogen (actual nitrogen) per acre over the field to which it is being applied.
3.46. Off-set shall mean the effect of the new water use has been accounted for and has been determined the same amount of water or less would be depleted from the stream over a 50-year period.
3.47. Operator shall mean that person who has the most direct control over the day-to-day farming operations of the land concerned.

3.48. Parts Per Million (ppm) shall mean a ratio used to describe the presence of any substance that may contaminate water, where one part of the contaminant is present among one million parts water.
3.49. Person shall mean a natural person, a partnership, a limited liability company, an association, a corporation, a municipality, an irrigation district, an agency or a political subdivision of the state, or a department, an agency, or a bureau of the United States.
3.50. Point Source Pollution shall mean any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, channel, tunnel conduit, well, discrete fissure, container, rolling stock, vessel, other floating craft, or other conveyance, over which the Nebraska Department of Environmental Quality has regulatory authority and from which a substance which can cause or contribute to contamination of groundwater is or may be discharged.
3.51. Property Boundary shall mean the boundary of ownership.
3.52. Replacement Well shall mean a water well which replaces an abandoned water well within three years of the last operation of the abandoned water well and is constructed to provide water to the same tract of land as the abandoned water well being replaced.
3.53. Rotation shall mean a recurring series of use and nonuse of irrigation wells on an hourly, daily, weekly, monthly, or yearly basis.
3.54. Soil Sampling shall mean the collection of soils for nutrient analysis. One soil sample for nitrate-nitrogen will consist of a minimum of eight cores representing no more than 80 acres. Entire soil cores must be collected to a minimum depth of 24 inches. Core depth increments of 0-8 inches and 8-24 inches are suggested.
3.55. Sub-Area or Sub-Basin shall mean a geographical area within the management area, which is so designated by the Board and for which controls specific to that sub-area have been adopted pursuant to these Rules and Regulations.
3.56. Sub-Irrigation or Sub-Irrigated Land shall mean the natural occurrence of a groundwater table within the root zone of agriculture vegetation, not exceeding ten feet below the surface of the ground.
3.57. Surface Water Project Sponsor shall mean an irrigation district created pursuant to Chapter 46, article 1, a reclamation district created pursuant to Chapter 46, article 5, or a public power and irrigation district created pursuant to Chapter 70, article 6.
3.58. Test Hole shall mean a hole designed to obtain information on hydrogeologic conditions characteristics of the water bearing layers in the aquifer prior to construction of a groundwater well.
3.59. To Commence Construction of a Water Well shall mean the beginning of the boring, drilling, jetting, digging, or excavating of actual water well from which groundwater is to be withdrawn.
3.60. Track of Land shall mean a portion of property defined by a number assigned by the County Assessor Office.
3.61. Trigger or Action Level Trigger is the measured or observed phenomenon that draws attention to the fact that corrective action should be taken to avoid an undesirable outcome if no action is taken; such as: groundwater quality, significant drawdown of neighboring wells following expansion of irrigated acres or a new well in the immediate area, subsidence of ground, significant lowering of the groundwater static water level in Sub-Basin, and other occurrences.
3.62. Variance shall mean: a.) a written approval to act in a manner contrary to the existing rules or regulations from a governing body whose rule or regulation is otherwise applicable; b.) a written approval to deviate from a restriction imposed by these Rules and Regulations.

3.63. Water Well/Groundwater Well shall mean any excavation that is drilled, cored, bored, washed, driven, dug, jetted, or otherwise constructed for the purpose of exploring for groundwater, monitoring groundwater, utilizing the geothermal properties of the ground, obtaining hydrogeologic information, or extracting water from or injecting water into the underground water reservoir. Water well shall not include any excavation made for obtaining or prospecting for oil or natural gas or for inserting media to re-pressure oil or natural gas bearing formations regulated by the Nebraska Oil and Gas Conservation Commission.
3.64. Water Well Permit/Groundwater Well Permit shall mean the authorization given by the District for construction of water wells capable of pumping greater than 50 gallons per minute in accordance with Neb. Rev. Stat. § 46-735.

4. ENFORCEMENT

4.1. The District shall enforce these Rules and Regulations by issuance of a formal notice of an alleged violation and/or through the issuance of cease and desist orders entered by the District's Board in accordance with the procedures hereinafter specified, and by bringing appropriate actions in the District Court of the county in which any violations occur. Cease and desist orders may be issued for the following reasons:

4.1.1. A person aggrieved by a ruling of the Board concerning a matter in these Rules and Regulations shall have the right to request a formal adjudicatory hearing.

4.1.2. Situations not covered by these Rules and Regulations may be considered by the Board on a case by case basis.

4.1.3. If a rule or regulation herein is declared invalid or unconstitutional, such a declaration will not affect the validity or constitutionality of the remaining rules, regulations or portions thereof.

4.1.4. Rules and regulations are not exempt from state laws, and nothing contained in these Rules and Regulations shall exempt a person from the provisions of applicable state laws.

5. COMPLAINTS

5.1. Any person who owns land, leases land, or resides within the District; or any non-resident person who can show the actions of any landowner or operator within the District directly affects him or her; or an employee or other agent of the Board so authorized; or the Board on its own motion, may file a written complaint. Said complaint shall be filed against a landowner/operator or both, and shall provide the information on which a violation of these Rules and Regulations or other violations of laws governed by these Rules and Regulations is alleged.
5.2. Complaints shall be filed at the office of the District, 410 Walnut Street, Butte, NE 68722, on complaint forms prepared by the District. Forms shall be made available at such office or other offices designated by the Board.

6. INSPECTIONS

6.1. When a written complaint alleging a violation of these Rules and Regulations is filed with the District, the Compliance Officer shall determine whether, because of the nature of the violation alleged, an inspection is necessary to determine whether or not the landowner or operator is, at the time of inspection, or was, at the time complained of, in violation of these Rules and Regulations. If the Compliance Officer determines that an

inspection is required, the land where the alleged violation occurred shall be inspected by the Inspector within five (5) days after the complaint is filed (excluding Saturdays, Sundays, and legal holidays).

6.2. The Inspector, upon proper identification and after informing the person in control of the land either in person or by certified mail, of the complaint and the Inspector's purpose, is authorized to enter upon the land if necessary for the purpose of making an inspection of the alleged violation. Upon completion of the inspection, the Inspector shall file a report of his or her findings with the Compliance Officer.

6.3. The Compliance Officer shall review the complaint, the inspection report, if any, and other information available to the District and shall decide whether, in his or her opinion, there is reasonable cause to believe that a violation has occurred or is occurring. Regardless of what the Compliance Officer concludes, the District shall deliver a copy of the complaint, any Inspector's report, and the Compliance Officer's conclusions to the alleged violator and to the complainant, if other than the Compliance Officer or the Board, in person, or shall transmit the same by certified mail.

7. ALLEGED VIOLATOR AND COMPLAINANT ALTERNATIVES

7.1. When the Compliance Officer's findings are delivered in accordance with Rule 6.3, it shall be accompanied by a formal notice of the alternative actions available to the alleged violator and the complainant. If the Compliance Officer's findings are that reasonable cause exists that a violation has occurred or is occurring, the alleged violator shall have the following alternative actions, all of which shall be outlined in such formal notice:

7.1.1. The alleged violator may agree with and accept as true and correct the Compliance Officer's findings an alleged violation has in fact occurred or is occurring; consent in writing to cease and desist from continuing or allowing the reoccurrence of such violation.

7.1.2. The alleged violator may reject the Compliance Officer's findings and request in writing that a formal hearing be scheduled and conducted in accordance with the Rules and Regulations of the District.

7.2. If the Compliance Officer's findings are that reasonable cause does not exist for believing that a violation has occurred or is occurring, complainant shall have the following alternative actions, all of which shall be outlined in such formal notice:

7.2.1. The complainant may accept the Compliance Officer's conclusions.

7.2.2. The complainant may reject the Compliance Officer's findings and may request in writing that a formal hearing be scheduled and conducted in accordance with the Rules and Regulations of the District.

7.3. The alleged violator or complainant shall respond and indicate any actions intended within ten (10) days (excluding Saturdays, Sundays, and legal holidays) of the date the said report and notice is provided to him or her.

8. ACTION SUBSEQUENT TO ALLEGED VIOLATOR CONSENT TO CEASE AND DESIST ORDER

8.1. When an alleged violator has been notified in accordance with Rule 7 and has consented to cease and desist in accordance with Rule 8, the Compliance Officer shall review the complaint, the Inspector's report, and any other related or pertinent documents.

8.2. The Compliance Officer shall determine whether the actions agreed to by the alleged violator will, when applied, bring such user into compliance with the controls adopted by the District. If the Compliance Officer determines the proposed actions of the alleged violator are adequate and will prevent future noncompliance within a reasonable time period, he or she shall approve such action or plan.

8.3. If the Compliance Officer determines that implementation of the proposed action or plan would be inadequate, he/she shall indicate the additions or changes he/she deems necessary.
8.4. The alleged violator shall have five (5) working days from the date on the return receipt of the certified letter to consent to, or reject such additions or changes and request a formal hearing. The original actions under Rule 8, and the documents filed in accordance therewith by the alleged violator shall not be considered at such hearing unless the alleged violator consents to such consideration.
8.5. The complainant shall be notified of any action by the Compliance Officer. The complainant shall have five (5) working days from the date on the return receipt of the certified letter to object to said approval or changes.
8.6. If no objections to the action taken are received, the proposed action or plan shall be considered approved.
8.7. If said complainant objects to the approval by the Compliance Officer, he/she may request a formal hearing or agree to negotiated changes in the approved schedule.

9. BOARD ACTION SUBSEQUENT TO ALLEGED VIOLATOR OR COMPLAINANT REQUEST FOR A HEARING

9.1. In accordance with Rule 7 or Rule 8, the Board shall hold a formal hearing when requested by an alleged violator or a complainant. Notice of the hearing shall be delivered to the alleged violator and the complainant, in person or shall be transmitted to the same by certified mail.
9.2. If, following a hearing, the Board determines the landowner/operator, has violated these Rules and Regulations, it shall adopt an order directing such violator to immediately cease and desist from all activities determined by the Board to be violations. The order shall specify any actions deemed necessary and appropriate. Said order shall be transmitted to the violator in person or by certified mail.

10. BOARD ACTION IF ALLEGED VIOLATOR FAILS TO RESPOND OR APPEAR

10.1. When an alleged violator has been notified of Board action in accordance with Rule 7, and such alleged violator has failed to respond, or when an alleged violator has been notified of Board action in accordance with Rule 8 of this section and has failed to appear at any properly scheduled formal hearing, the Board shall:

10.1.1. Review the complaint, the Compliance Officer's report, any inspection report, and any other pertinent information; and

10.1.2. Review such findings, and issue such order or orders in accordance with these Rules and Regulations as it deems appropriate based upon the information available.

11. ALLEGED VIOLATORS ACTIONS FOLLOWING ISSUANCE OF CEASE AND DESIST ORDER

11.1. When a cease and desist order has been issued by the District and transmitted to the alleged violator either in person or by certified mail, the alleged violator shall be given seven (7) days (excluding Saturdays, Sundays, and legal holidays) to comply with said order. In this time, the alleged violator may submit an action or plan to correct deficiencies of said cease and desist order. The action or plan shall be approved by the Compliance Officer if it is in accordance with said cease and desist order.
11.2. If after seven (7) days (excluding Saturdays, Sundays and legal holidays), the alleged violator does not respond to the cease and desist order or responds stating that he/she refuses to comply with said order, the order will be filed with the District Court for prosecution in the county in which the violation is alleged to occur. Violation of a cease and desist order shall be consistent with Neb. Rev. Stat §*46-745* and violators shall be

subject to a civil penalty of not less than one thousand and no/100 dollars ($1,000.00) and not more than five thousand and no/100 dollars ($5,000.00) for each day an intentional violation occurs.

12. BOARD AUTHORIZATION TO INITIATE COURT ACTION

12.1. The Board may initiate appropriate legal actions in the District Court of the county in which the violation has occurred whenever necessary to enforce any action or orders of the District in accordance with these Rules and Regulations.

13. ESTABLISHMENT OF GROUNDWATER MANAGEMENT AREA

13.1. The District, following a Public Hearing held in accordance with Neb. Rev. Stat. § 46-712, §46-739, and §46-743, may establish a Groundwater Management Area and adopt rules and regulations governing the: a.) Protection of the groundwater quality; b.) Protection of the groundwater quantity; or c.) Prevention or resolution of conflicts between hydrologically connected groundwater users and surface water appropriators .

13.2. The District adopts the following Rules and Regulations for groundwater quality purposes by any of the following means: a.) Requiring utilization of Best Management Practices for the operation of irrigation systems and crop fertilization practices; b.) Requiring the analysis of irrigation water and the deep soil sampling and analysis thereof for fertilizer and chemical content; c.) Requiring attendance at educational programs designed to teach practices to protect groundwater and surface water quality, as well as testing of participants in the courses, and certification of participating participants after successfully completing the educational programs; d.) Requiring submittal of crop and irrigation water reporting forms; e.) Other requirements as specified in the respective management area phase designation or as adopted by the District Board.

14. GROUNDWATER QUALITY MANAGEMENT SUB-AREA PHASE DESIGNATION AND CONTROLS

14.1. The Lower Niobrara Natural Resources District has monitored groundwater quality in approximately 455 irrigation wells since 1996. This program of monitoring groundwater quality, together with research programs by others, has identified a widespread nitrate contamination problem in the groundwater underlying the District. A small portion of the groundwater samples are also monitored for other contaminates, primarily pesticides. Although other contaminants have been identified in the District's groundwater, concentration levels are well below Maximum Contaminant Levels (MCLs) as established by the Environmental Protection Agency (EPA).

14.2. To address the ever-increasing problem of high nitrate in the groundwater, the District has adopted controls to deal with the problem and possibly reverse the trend. Most of these controls are Best Management Practices (BMPs) which are designed to protect the environment, but also increase management efficiency, saving the crop producer input costs.

14.3. Although the groundwater nitrate contamination problem is widespread, it is not uniform throughout the entire District. Therefore, the District is divided into Groundwater Management Protection Areas and Sub-Areas, referred to as Groundwater Quality Management Sub-Areas, each with a range of nitrate-nitrogen concentration in the groundwater in that particular Sub-Area. A Phase I Management Sub-Area corresponds to a nitrate-nitrogen concentration of 0-7.5 parts per million (ppm). Phase II Management Sub-Area corresponds to a nitrate-nitrogen concentration in the groundwater of greater than (>) 7.5 to 9.5 ppm. A Phase III Management Sub-Area corresponds to an area with nitrate-nitrogen concentration levels > 9.5 ppm. The entire District was

initially designated as Phase I in 1996 when the District's Groundwater Management Plan was adopted by the Board. After monitoring for two consecutive years some subareas were determined to be greater than 0-7.5 ppm and the sub area was designated in accordance with Rule 14.4.

14.4. Prior to establishing or changing the designation of any Groundwater Quality Management Sub-Area from a lower to a higher Phase, there shall be a public hearing held to allow testimony in favor or against the establishment of the proposed Groundwater Quality Management Sub-Area change.

14.5. Designation of Groundwater Quality Management Sub-Areas.

14.5.1. Phase I Groundwater Quality Management Sub-Area: 0 - 7.5 ppm nitrate-nitrogen: Following a public hearing in 1996, the entire Lower Niobrara Natural Resources District (LNNRD) was designated as a Phase I Groundwater Quality Management Sub-Area. A Phase I management sub-area primarily promotes the implementation of Best Management Practices (BMPs) through educational programs. Much of the District is still designated as a Phase I Groundwater Quality Management Area.

14.5.2. Phase II Groundwater Quality Management Sub-Area: >7.5 - 9.5 ppm nitrate-nitrogen: a.) If after a minimum of two monitoring periods (where a monitoring period is two years) and the groundwater quality sampling data verifies the concentration of nitrate-nitrogen in the groundwater is within the Phase II range, the phase designation will be changed to Phase II by the Board, following a public hearing; b.) Phase II management sub-areas will be designated by townships (36 square miles) or sub-townships within the District; c.) Before a Phase II management sub-area can be designated, 50% of the registered irrigation wells monitored by the District, within a township or sub-township, must have nitrate levels greater than 75% of the Maximum Contaminant Level (MCL) as determined by the EPA. As of Jan. 1, 2014, the MCL level is 10 ppm. (parts per million); d.) In sub-areas with nine or fewer registered irrigation wells, the District may monitor all such wells and work with operators managing those wells on an independent basis. If those wells are concentrated in one part of a township, the District may subdivide that township for Phase designation and monitoring. All portions of subdivided townships are subject to appropriate Phase regulations; e.) An area will remain in Phase II for a minimum of two monitoring periods (each monitoring period is two years), after which time the evaluation of data will enable the District to determine the Phase designation for the following two monitoring periods.

14.5.3. Phase III Groundwater Quality Management Sub-Area: >9.5 ppm nitrate nitrogen: a.) If after a minimum of two monitoring periods (where a monitoring period is two years) in Phase II, the groundwater quality sampling data verifies the concentration of nitrate-nitrogen in the groundwater is within the Phase III range, the phase designation will be changed to Phase III by the Board, following a public hearing; b.) Phase III management sub-areas will be designated by townships (36 square miles) or sub-townships within the District; c.) Before a Phase III management sub-area can be designated, 50% of the registered irrigation wells monitored by the District, within a township or sub-township, must have nitrate levels greater than 95% of the Maximum Contaminant Level (MCL) as determined by the EPA. As of Jan. 1, 2014, the MCL level is 10 (parts per million); d.) In sub-areas with nine or fewer registered irrigation wells, the District may monitor all such wells and work with operators managing those wells on an independent basis. If those wells are concentrated in one part of a township, the District may subdivide that township for Phase designation and monitoring. All portions of subdivided townships are subject to appropriate Phase regulations. An area will remain in Phase III for a minimum of two monitoring periods (each monitoring period is two years), after

which time the evaluation of data will enable the District to determine the Phase designation for the following two monitoring periods.

14.6. Groundwater Quality Management Sub-Area Controls.

14.6.1. Phase I Groundwater Quality Management Sub-Area: 0 – 7.5 ppm nitrate-nitrogen.

14.6.1.1. All operators or contract applicators of nitrogen fertilizers involved in the decision of whether to apply nitrogen fertilizer, whether by contract or privately, must maintain certification in nitrogen management if the agricultural land to be fertilized is larger than one acre or if more than fifty (50) pounds of actual nitrogen per acre will be applied. Nitrogen Management Certification from other NRDs will be accepted as fulfillment for certification requirements in the District. This will be accomplished by attending a class once every four years as conducted by the District. Recertification can be completed by a take home test provided by the NRD or another approved method.

14.6.1.2. The District discourages fall (September 23 to December 20) and winter (December 21 to March 1) application of commercial nitrogen fertilizer until after March 1 on any soil type. This does not apply to applications of less than 20 pounds of actual nitrogen per acre on fall or spring seeded crops.

14.6.1.3. The District recommends that all irrigation wells be sampled and analyzed for nitrate-nitrogen once every four years by the operator or District staff and reported on a form provided by the District.

14.6.1.3.1. The water sample shall be collected after the well has been running for at least 15 minutes. This water sample may be analyzed at the District Office in Butte or sent to a laboratory for analysis. Please contact the office for assistance in locating a laboratory to perform the test.

14.6.1.4. The District encourages a voluntary nitrate-nitrogen water analysis for all domestic and stock wells. The water sample shall be collected after the well has been running for at least 15 minutes. This water sample may be analyzed in the District Office in Butte or sent to a laboratory for analysis. Please contact the office for assistance in locating a laboratory to perform the test.

14.6.1.5. The District encourages deep soil sampling for nitrate analysis on each field of at least 40 acres or more when applying more than 50 pounds of actual nitrogen/acre/year.

14.6.1.6. One soil sample for nitrate-nitrogen will consist of a minimum of eight cores representing no more than 80 acres. Entire soil cores must be collected to a minimum depth of 24 inches. Core depth increments of 0-8 inches and 8-24 inches are suggested.

14.6.1.7. The composite soil sample shall be sent to a soil lab approved by the District. Please contact the office for assistance in locating a laboratory to perform the test.

14.6.1.8. The recommended nitrogen fertilizer application rate will be determined by using UNL recommendations or a crop advisor certified by the American Society of Agronomy.

14.6.2. Phase II Groundwater Quality Management Sub-Area: >7.5 – 9.5 ppm nitrate-nitrogen:

14.6.2.1. Phase I requirements will remain in effect unless modified by Phase II requirements.

14.6.2.2. All operators or contract applicators of nitrogen fertilizers involved in the decision of whether to apply nitrogen fertilizer, whether by contract or privately, must maintain certification in nitrogen management if the agricultural land to be fertilized is larger than one acre or if more than fifty (50) pounds of actual nitrogen per acre will be applied. Nitrogen Management Certification from other NRDs will be accepted as fulfillment for certification requirements in the Lower Niobrara NRD. This will be accomplished by attending a class once every four years as supplied by the District. Recertification can be completed by a take home test provided by the NRD or another approved method.

14.6.2.3. Fall (September 23 to December 20) and winter (December 21 to March 1) application of commercial nitrogen fertilizer will not be allowed until after November 1 and is discouraged until March 1 on any soil type. Exceptions will be allowed for application rates of less than 20 pounds/acre of actual nitrogen on fall or spring seeded crops. Spring (March 1 to June 20) applications of commercial fertilizer greater than 100 pounds of actual nitrogen per acre will be encouraged through split applications (i.e. pre-plant, pesticide applications, starters, pivot applications, and side-dress).
14.6.2.4. Deep soil sampling and nitrate analysis on fields of at least 40 acres is required when applying more than 50 pounds/acre/year of actual nitrogen. Samples are required to extend at least two feet down, and are encouraged to extend three feet. Each sample should represent an area no larger than 80 acres and will consist of a minimum of eight cores. Entire soil cores must be collected to a minimum depth of 24 inches. Core depth increments of 0-8 inches and 8-24 inches are suggested. Crops following a legume crop will not be required to have deep soil analysis prior to the harvest of that crop.
14.6.2.5. Sampling and analysis shall be performed prior to application of commercial nitrogen fertilizer or manure on each crop field for the ensuing year.
14.6.2.6. The composite soil sample shall be sent to a soil lab approved by the District. Please contact the office for assistance in locating a laboratory to perform the test.
14.6.2.7. The recommended nitrogen application rate will be determined by using UNL recommendations or a crop advisor certified by the American Society of Agronomy.
14.6.2.8. Operators shall submit annually a Crop Report to the District by December 31, (at the end of each crop year just completed), on a form provided by the District. A form will be filed for each field of at least 40 acres. This annual Crop Report Form will include: a.) Results of water nitrate analysis for each irrigation well supplying water to the field. Results must be for the well water sampled and analyzed within the last two years; b.) Crop planted and the estimated yield; c.) Crop to be planted next year; d.) Nitrogen fertilizer need assessment for the crop to be planted. Operators will be required to include fertilizer application rates based on University of Nebraska Lincoln (UNL) recommendations or a certified crop advisor certified by the American Society of Agronomy; e.) Actual amount of nitrogen fertilizer applied to the field (type of commercial fertilizer, manufacturer, type of manure or organic fertilizer applied) and amount of pesticide applied; f.) Actual crop yield realized; g.) Metered quantity of groundwater, (in total inches) applied to the crop or an estimate based on well pumping rate. The District can easily and quickly determine the pumping rate by taking measurements with an ultrasonic flow meter to determine the volume of water applied through the irrigation system; h.) Results of deep soil analysis. (Some fields may not require sampling and analysis. See Phase II requirements.)
14.6.2.9. Residents of towns within a Phase II Sub-Area who apply fertilizers or pesticides are encouraged to attend a workshop presented by the District to inform attendees about proper application of lawn and garden chemicals.
14.6.2.10. Animal waste and municipality waste shall be properly applied and accounted for to avoid surface and groundwater contamination.
14.6.2.11. All livestock facilities requiring a permit must be properly permitted by the State of Nebraska. A copy of the permit must be filed with the District.
14.6.2.12. Nitrogen application, including waste (solid or effluent) shall not exceed crop need. Waste effluent pumped from a lagoon or waste pit, applied to the ground by an irrigation system, knifed into the

ground or surface applied, must be properly accounted for and made a part of the total crop need assessment. The District recommends the waste be analyzed at a lab and the District will assist the producer in finding a lab to perform the test.

14.6.2.13. The District discourages spreading of waste on frozen or snow covered ground. If waste is spread on frozen ground it will be limited to land where slopes are 4% or less or have adequate erosion control practices.

14.6.2.14. Waste will not be spread on land subject to frequent flooding, that is, land subject to flooding more than once in a 10 year period.

14.6.2.15. Waste shall not be spread into a drainage area or within 200 feet of an adjacent water body.

14.6.2.16. Waste disposal is discouraged on tilled ground with greater than 10% slopes unless adequate erosion control practices are present.

14.7. Bazile Groundwater Quality Management Area

14.7.1.1. Area Designation and Boundaries: The Bazile Groundwater Quality Management Area includes all of Township 29N Range 6W (Miller Township); all of Township 29N Range 7W (Logan Township) and all of Township 29N Range 8W (in Walnut Grove Township) in Knox County, Nebraska, which is located in the southeast corner of the District.

14.7.1.2. The portion of the Lower Niobrara Natural Resources District located in the Bazile Groundwater Quality Management Area is shown on the map in Appendix 3

14.7.1.3. The Bazile Groundwater Management Area is subject to all requirements of a Phase I and Phase II Groundwater Quality Management Area, plus requirements designated by the governing body. The requirements are listed in Appendix 4.

15. CERTIFICATION OF ALL GROUNDWATER USES

15.1. The area subject to Certification of All Groundwater Uses is the entire geographic area within the geographical boundaries of the District.

15.2. By January 1, 2017, all groundwater uses in the District shall be certified and approved by the District in accordance with these Rules and Regulations. The certification process will be conducted by the District and according to the following schedule: a.) Boyd and Keya Paha Counties: by April 1, 2015; b.) Knox and Rock Counties: by October 1, 2015; c.) Holt County: by April 1, 2016; d.) This process may be expedited quicker if staffing allows.

15.3. It is incumbent upon the person applying for certification of groundwater use to present to and thoroughly review with the District all documentation with the District during the certification process to ensure the purpose and quantity of groundwater use within the District is accurately accounted for and agreed upon by the parties.

15.4. Certification of Groundwater Use for Irrigation.

15.4.1. A landowner, who uses a regulated well for the purpose of supplying groundwater to irrigated crops within the District, must obtain District certification for each irrigated tract. This certification can be accomplished by applying to the District on District forms. The District will consider historical information provided by the applicant that verifies groundwater irrigation use on the tract for a minimum of two (2) out of the last ten (10) years. The documentation submitted with the application must include: a.) Location of each tract to be irrigated by legal description to the nearest quarter section; b.) Aerial photo

or map of each tract; c.) Size, in acres, of the irrigated tract; d.) Department registration number(s) of any wells historically used to irrigate each tract; e.) Any sources of irrigation water other than groundwater to be used on each tract; f.). USDA-FSA records for each tract for the year an irrigation history is claimed; g.) County Assessor records for each tract for the year an irrigation history is claimed; h.) Any other information deemed necessary by the District.

15.4.2. Acres that were historically irrigated, which do not meet the requirements 15.4.1 (irrigated 2 of the last 10 years), but meets the minimum ranking criteria without conservation practices added for the addition of irrigated area (18.19-18.20) shall receive 95% certification of the total amount of irrigated acres should the person certifying the acres decide to reactivate those acres for irrigation purposes.

15.4.3. Acres with documented irrigated history but currently enrolled in any local, state, or federal conservation programs that would prevent the landowner from irrigating and meets the minimum ranking criteria without conservation practices added for the addition of irrigated acres (16.19-16.20) shall receive 95% certification for the total amount of irrigated acres should they choose to proceed with the certification process with the following conditions: a.) Acres must be certified respectfully by dates associated with this Rule; b.) Proof of historical use shall be by submission of information specified in this rule and had the means to irrigate during that time period.

15.4.4. Acres which do not meet the 2 out of the last 10 years must go through the Variance Committee to be certified as irrigated acres.

15.5. New or Added Acres are required to meet all the requirement of 15. 4. for certification of irrigated acres.

15.6. Certification of Groundwater Uses for Public Water Supply.

15.6.1. Any person who uses a regulated well to supply groundwater for public supplies must obtain certification of each use by applying to the District on forms provided by the District. The applicant shall furnish the following information with the application: a.) Public water supply system permit number(s); b.) Registration number of water well(s); c.) Location of groundwater use by legal description or map of distribution area; d.) Identification of any sources of water for the public water system other than groundwater; e.) Total number of service connections.

15.7. Certification of Groundwater Uses for other than Irrigation and Public Water Supply.

15.7.1. Any person who uses a regulated well to supply groundwater with a capacity of greater than 50 gallons per minute for uses other than irrigation of crops or public water supply must obtain certification of each use by applying to the District on forms provided by the District. The applicant shall furnish the following information with the application: a.) Purpose of groundwater use; b.) Location of groundwater use by legal description; c.) Registration number of water well(s); d.) Identification of any sources of water for the use other than groundwater.

15.8. Consideration of Documentation Supporting Applications for Certification of Groundwater Uses and Certification Decisions.

15.8.1. The District will take into consideration the documentation concerning groundwater uses from the following sources, and in the following order of preference: a.) Records of the U.S. Department of Agriculture; b.) Records of the County Assessor; c.) Evidence submitted by the applicant or the District's staff; d.) Any other information deemed relevant by the District; e.) The District may request more information from an applicant.

15.8.2. Certification of groundwater uses will be based on the size and location of irrigated tracts, the capacity of livestock operations, or on the amount and purpose of other uses based on two of the last ten years. Applicants who feel the information for that period does not reflect normal circumstances for that groundwater use may produce evidence to support their case. The District shall take this evidence into consideration when reviewing applications for certification. The application will be reviewed by the Variance Committee of the District for a recommendation to the District Board. A majority vote by the Board of Directors present at an open meeting of the Board shall be necessary for approval of an application for certification.

15.9. Changes in Certification.

15.9.1. The Board may re-evaluate any determination on certification of groundwater uses from time to time on its own motion or upon receiving an application for change in certification from an owner. Such application for change must be submitted on forms provided by the District. The Board may approve changes if it finds that such changes would not increase the number of total irrigated acres, or otherwise have detrimental effects on neighboring groundwater or surface water users. The Board may rescind any previously approved certification if it finds:

15.9.1.1. The application for certification contained any false or misleading information; or the groundwater user failed to meet any conditions stipulated in the certification.

15.9.1.2. Any change in property ownership that results in a certified groundwater use passing from one person to another must be reported to the District by the new property owner within 60 days of the completion of the transaction on forms provided by the District.

15.9.1.3. If for any reason, including but not limited to consideration for receipt of funds paid by the District or by any other party, a landowner agrees to permanently discontinue irrigation on acres for which certification has previously been approved, the Board shall rescind such certification to the extent it applies to those acres.

15.9.1.4. Any time a certification is modified or rescinded the District shall notify the applicable landowner or landowners by certified mail of any changes in or rescission of a previously approved certification.

15.9.1.5. A groundwater user aggrieved by a determination of the Board regarding certification of groundwater use may request a hearing before the District for the purpose of reconsidering the decision. The request must be filed with the District within thirty (30) days of receipt of notice of the Board's action on the groundwater user's application. Such hearing shall be conducted in accordance with the District's Rules and Regulations for an informal, non-adjudicatory hearing, unless a groundwater user requests a formal adjudicatory hearing. The burden of proof shall be on the groundwater user to document the District's decision should be reviewed.

15.9.1.6. The Board may grant a variance from the strict application of these Rules and Regulations if it determines that construction of a new groundwater well for irrigation, public water supply, commercial, or any other reason to alleviate an emergency situation involving the supply of water for human consumption or for any other reason supported by good cause shown. The request for a variance must provide all the information requested by the District on forms provided by the District, and any other information requested by the District. Such request shall be acted upon by the Board following a public hearing.

16. APPLICATION FOR EXPANSION OF GROUNDWATER IRRIGATED ACRES

16.1. In accordance with Neb. Rev. Stat. §§ 46-707(1) and 46-714(12) the District may allow a limited number of total new groundwater irrigated acres annually to maintain the current status of the District as not being fully appropriated. The number of new groundwater irrigated acres will be limited to no more than 2,500 acres per year for the entire geographic area within the geographical boundaries of the District. The Board reserves the right to approve less than the 2500 acres on an annual basis. There will be no carryover of unapplied for acres.

16.2. The District will enforce this limitation consistent with its authority under the law and its Rules and Regulations. In addition, a violation of these provisions may be grounds for denying an application to expand groundwater irrigated acres under the ranking criteria set forth below.

16.3. If a request for expansion of new irrigated acres requires construction of a new groundwater well, the respective well permit application will not be accepted until authorization is granted by the District for the expansion of those irrigated acres.

16.3.1. If the acres will be irrigated with a new well(s) the application shall include: a.) Approximate legal description for the new well(s); b) All proposed well(s) for the addition of irrigated acres must meet all the requirements set forth in Rule 17.

16.4. If the new irrigated acres are to be irrigated with existing well(s) the application shall include the well registration number(s) of all well(s).

16.5. The Board will at their regularly scheduled June board meeting determine if the District will allow the addition of irrigated acres for that calendar year.

16.5.1. If the Board allows the addition of irrigated acres for that calendar year, a letter will be sent to the Department stating the total number of new irrigated acres the District has approved.

16.5.2. If the Board does not allow the addition of irrigated acres in that calendar year, a letter will be sent to the Department requesting the Department to deny granting any new surface water appropriations.

16.6. The application period to apply for new groundwater irrigated acres shall only be annually during the months of July and August. An application received outside of an application period will be returned to the applicants as incomplete. All application materials and documents shall be signed and provided by the applicant rather than any designee, contractor, or agent.

16.7. A maximum of 160 irrigated acres per individual, corporation, limited liability company, partnership, other entity or trust will be allowed per application period for expanded irrigated acres. Multiple parties are prohibited from sharing a well(s) and/or pivot system to irrigate adjoining lands even if the total number of acres to be irrigated by using the shared well(s) and/or pivot system totals less than 160 acres.

16.8. For the purposes of this rule, if an individual and any member of his or her immediate family owns and controls, directly or indirectly, more than fifty percent (50%) of the ownership of said irrigated acres, either individually or through a corporation, limited liability company, partnership, other entity or trust, such irrigated acres will be considered as owned by the applicant. A member of one's immediate family shall include spouses, children, and lineal descendants of the same.

16.9. The application shall be accompanied with a non-refundable filing fee to be determined annually by a majority vote of the Board prior to the application period.

16.10. The applicants will be notified on the status of their application within 60 days following the application period.
16.11. Applications not approved may be resubmitted the following year with the appropriate non-refundable filing fees.
16.12. The application shall be made on forms provided by the District. The Board instructs staff to prepare the relevant forms and submit them to the Board for approval.
16.13. The application shall include the most recent aerial photo delineating the new acres being applied and, as applicable, the proposed location of the new well(s) or location of existing well(s) to be used.
16.14. The current landowner or duly authorized representative shall sign the application and be present when application is presented to and reviewed by the staff.
16.15. Application is non-transferable between parcels of land, water wells or applicants.
16.16. Application does not include the Permit Fee to Construct a Water Well.
16.17. Application may be declined if it is incomplete or information is inaccurate.
16.18. The District will review the application for expanding groundwater irrigated acres based on factors including, but not limited to, whether or not the expanded irrigated acres in the application would support/promote the overall goal of the IMP in attaining and or maintaining a desired balance between water uses and water supplies, while contributing to the near and long term objectives of the District of protecting and sound management of our natural resources.
16.19. The Board retains the authority to establish ranking criteria for the evaluation of applications for expanding the number of acres irrigated with groundwater. Factors to be considered in the ranking criteria may include, but are not limited to, the following: a.) Irrigation system type (e.g., sprinkler, drip, or flood); b.) Land capability class rating using USDA Natural Resources Conservation Service Web Soil Survey; c.) Stream depletion factors using best available science; d.) Groundwater quantity; e.) No more than 3 well permits well be granted per existing or anticipated irrigation system; f.) Groundwater quality (nitrates) and compliance with the Nitrogen Certification Guidelines in the District's Ground Water Management Plan; g.) Irrigation concentration (well spacing requirements); h.) All wells are required to be a minimum of 600 feet from any existing high capacity well(s) for irrigation and 3000 feet from public water supply well(s); i.) Compliance with District Rules and Regulations, including compliance with the limitation on expansion of groundwater irrigated acres under these provisions; and j.) Such other factors that may assist the Board in determining whether the application would promote the goals of groundwater management and conservation within the District.
16.20. A minimum of score of 20 points on the Lower Niobrara Natural Resources District Criteria Ranking for Adding New Irrigated Acres in the Lower Niobrara NRD is required for an application to be considered for approval. A copy of the current ranking sheet is available at the District Office, 410 Walnut Street, Butte, NE.
16.21. Ranking score may be improved by adding conservation practices or removing lower class land from the area to be irrigated. A maximum of 15 points can be added to a score utilizing conservation practices. The Board may decide the conservation practices which may be applied to the particular track in the application for expanded irrigated acres.
16.22. The installation of a flow meter is required as a condition for any application for expansion of irrigated acres.
16.23. Flow rate and total volume of water pumped during the irrigation season will be reported by the owner/operator and submitted to District staff on an annual basis by December 31st of each year. As a condition

of approval to expand groundwater irrigated acres, the landowner shall agree that District staff shall be granted access to all land approved for irrigation under these Rules.

16.24. Applications granted under these provisions are deemed unique and special with regard to the specific application, and do not create a precedent for future applications or matters pertaining to other lands, whether or not they are similarly situated.

16.25. Approved applications for the expansion of irrigated acres will have until September 1st of the following calendar year (for example: applications approved in October 2015 must be completed by September 1, 2016) for all conditions of the application to be completed.

16.26. The District may cancel an approved application for expansion of irrigated acres at any time there is a violation of the District's Rules and Regulations.

17. GROUNDWATER WELL PERMITS

17.1. Any person that owns or controls land upon which the construction, decommissioning or temporary capping of a water well is to be accomplished, shall accomplish such tasks in accordance with the Water Well Standards and Contractor Licensing Act and the regulations adopted pursuant thereto.

17.2. Any person who intends to construct any new or replacement water well(s) that fall within the following categories on land which he/she owns or controls within the District shall, before commencing such activity, apply for a permit from the District on forms provided by the District and receive approval from the District:

17.2.1. Any groundwater well designed and constructed or modified to pump greater than fifty (50) gallons per minute.

17.2.2. Any water well designed and constructed to pump fifty gallons per minute or less if such water well is combined with any other water well(s) or other water source serving a single purpose, other than a water source used to water range livestock. Each source requires a permit and registration with the Department.

17.2.3. Any groundwater well drilled, bored, or constructed by any means to be a horizontal or angled well capable of drawing groundwater from an area laterally located from the drill hole at the ground surface is an illegal well and prohibited from construction and use.

17.3. Any person who has failed to obtain a permit as required by Rule 17 shall make application for a late permit on forms provided by the District.

17.3.1. The late permit application shall contain the same information as required by Rule 17. The application for a late permit shall be accompanied by a two hundred fifty dollar ($250) fee payable to the District.

17.3.2. If the late permit does not meet the requirements of this rule it will be considered an illegal well and must be properly abandoned and sealed.

17.4. Spacing of Water Wells – No water well requiring a permit under this rule shall be constructed within 600 feet of any other registered irrigation, domestic, livestock well, commercial or industrial well under separate ownership or any not-yet-constructed wells with a valid well permit, or within 3,000 feet of a public water supply well(s).

17.4.1. Spacing from a field boundary where a well is to be constructed should be at least one half (300 feet) the distance set forth in 17.4.

17.5. Replacement well spacing shall be constructed no more than 150 feet from the original well and must be located within the track of land to be irrigated. If the replacement well is to be located greater than 150 feet from the original well or outside the track of land to be irrigated it will need to meet the requirements of 17.11.

17.6. Illegal Water Wells. are not protected by the provisions of this rule. The failure of a person to update water well registration information, ownership and irrigated acres records shall not jeopardize his/her well spacing protection provided under this rule unless: a.) the District determines that said person has knowingly attempted to deceive the District; b.) the well owner was notified by the District the water well was identified as unregistered and constructed after such date in which registration was required and said person failed to act in good faith to register the water well. If the well owner agrees to comply with registering the water well, the District will provide assistance as needed; c.) District determines that said person has failed to act in good faith in matters pertaining to these Rules and Regulations.

17.7. Commingling of Groundwater Well(s) and/or Surface Water.

17.7.1. Helper, supplemental, combined well(s) may be constructed subject to the following conditions:

17.7.1.1. A helper well application must be submitted with a non-refundable fee of one hundred dollars ($100.00). The application process may take up to one year to complete

17.7.1.2. A flow meter must be present to obtain the flow rate of the well(s) supplying the system.

17.7.1.3. Flow rate of well(s) supplying the system must be recorded by District staff monthly during growing season to establish an average flow rate of the system for a growing season.

17.7.1.4. Flow rates averaging more than the University of Nebraska Gross System Capacity, gallons per minute per acre (gpm/ac) formula for soil type will not qualify for additional helper/supplemental well. (Crop Watch, July 6, 2012, Irrigation Management with Limited Capacity or Water Allocations)

17.7.1.4.1. Gross System Capacity, gpm/ac = system flow rate (gpm) divided by acres irrigated (example 800 gpm/130 ac = 6.2 gpm/ac)

17.7.1.4.2. Net capacity 9 of 10 years (gallons per minute per acre) by soil type in region 1 which includes the entire geographic area within the geographical boundaries of the District in Holt, Boyd and Knox Counties. The gpm/ac by soil type are: Silt Loam – 3.9, Sandy Clay Loam – 4.1, Silty Clay Loam – 4.2, Silty Clay – 4.4, Sandy Loam – 4.5, Loamy Sand – 4.8, Fine Sand – 5.0. (list of soils of the District can be found in Appendix 7)

17.7.1.4.3. Net capacity 9 of 10 years (Gallons per minute per acre) by soil type in region 2 which includes the entire geographic area within the geographical boundaries of the District in Keya Paha and Rock Counties. The gpm/ac by soil type are: Silt Loam – 4.6, Sandy Clay Loam – 4.9, Silty Clay Loam – 5.1, Silty Clay – 5.1, Sandy Loam – 5.2, Loamy Sand – 5.4, Fine Sand – 5.9. (list of soils of the District can be found in Appendix 7)

17.7.1.5. The applicant will have the site evaluated by an independent hydrologic engineer to determine the effect of a new well on surrounding registered well(s).

17.7.1.6. The application meets all other requirements listed in this rule.

17.7.2. No comingled, combined or cluster of wells will be allowed to supply greater than the Gross System Capacity gpm/ac for the soil type irrigated by the system.

17.7.3. Spacing for commingled water wells: When water wells are commingled, combined, clustered, or joined and have a combined total capacity greater than fifty (50) gallons per minute, each water well shall comply with all provisions of Rule 17.4.

17.7.4. Request for a well spacing variance – Any person applying for a permit to construct a well that would violate any portion of Rule 17 may request a variance as outlined in Rule 20.

17.7.5. Commingling of Groundwater and Surface Water. Groundwater wells may be allowed to be added to surface water systems on a case by case basis. Applications for comingling groundwater and surface water

can be made through the Variance Committee following the Rules set forth in Rule 20. In the alternative, the District may issue a groundwater well permit to landowners who desire to use groundwater on lands which have a surface water appropriation attached, provided the landowner has relinquished the surface water appropriation to offset or mitigate the groundwater use.

17.8. Application Information Required to Obtain a Groundwater Well Permit.

17.8.1. The application for a new groundwater well shall be accompanied by a non-refundable fifty-dollar ($50.00) filing payable to the District and shall contain the following information: a.) Name and post office address of the owner(s); b.) Intended use; c.) Intended location of the proposed groundwater well or other means of obtaining groundwater; d.) Intended size, type and description of the proposed groundwater well and the estimated depth; e.) Estimated capacity in gallons per minute; f.) Acreage and location of the land involved if the water is to used for irrigation; g.) Description of the proposed use if other than for irrigation purposes; h.) Registration number of the water well being replaced if applicable; and i.) Such other information as the District requires.

17.8.2. Each application for a groundwater well permit must be accompanied with documentation that a test hole(s) was drilled to determine the likelihood of developing a satisfactory well before the well to be constructed is started. The following information regarding each test hole(s) shall be collected and submitted to the District with the well application: a.) Geologic/lithologic log of materials encountered with depth; b.) Geographic coordinates of the test hole location; c.) Test hole must be drilled within 330 feet of the proposed well location as indicated on the well permit application; d.) Geologic/lithologic log must clearly detail the depth, color, thickness and size of material of the various geologic formations encountered and the measured depth to groundwater from the ground surface.

17.8.3. If the District finds the application for a permit or late permit is incomplete or needs corrections, it shall return the application to the applicant for any necessary corrections. Corrections must be made within sixty (60) days or the application will be cancelled. No refund of any application fees shall be made regardless of whether the permit is approved, canceled or denied.

17.9. Well Permit Application Review. District staff will review the applications received and compile all pertinent hydrogeologic data, information provided by the applicant and other information. The information will be brought to the Groundwater Management Committee for consideration where upon a recommendation will be made to approve, deny or table the application. The recommendation by the Committee will be brought before the entire Board for consideration. An application may be tabled until the next Board meeting if the Groundwater Management Committee and/or Board feels additional information is needed to make a decision or the application was received after 4:30 pm on the Thursday prior to the regularly scheduled monthly Board meeting the first Monday of each month.

17.10. Using the best data available to the District, including any information submitted by the applicant as part of the well permit application, evidence must show the proposed well has the ability to meet or exceed the flow volume included on the permit application and produce enough water to support the purpose shown on the permit application. Data must also show the well will not have a significant negative impact to the long term sustainability of the aquifer that serves as the primary source of water for the proposed well and the proposed well will not negatively impact the ability of pre-existing properly constructed, maintained and operated registered wells served by the same primary aquifer to operate in a reasonable manner. Permit applications meeting all the criteria set forth in this section shall be approved by the District and those failing to meet the criteria shall be denied or approved with conditions as established by the District.

17.11. The District has developed a standardized method for evaluating and ranking well permit applications based upon criteria set forth in the District's Well Permit Ranking System (See Appendix 6). The main criteria considered includes: a.) Thickness of primary aquifer formation; b.) Calculated transmissivity of the primary aquifer formation; c.) Well density of surrounding irrigation, domestic, livestock and public water supply wells; d.) Method of applying groundwater to land if the well permit application is for irrigation; and e.) All wells must meet a minimum score of 250 point to be considered.

17.12. Public water supply wells are subject to all requirements set forth by the Nebraska Department of Health and Human Services, as well as Sections 17.2 and 17.8.1.

17.13. No more than three irrigation groundwater wells will be approved to supply water to a single tract of land or to one irrigation system.

17.13.1. All wells supplying a system must be located within the track of land to be irrigated.

17.13.2. If a groundwater well cannot be located within the same track of land a variance can be applied for according to Rule 20.

17.14. Denial of a permit. An application for a permit or late permit for a groundwater well in a management area shall be denied only if the District finds: a.) Application fails to meet the criteria set forth in Rule 17; b.) Location or operation of the proposed groundwater well or other work would conflict with any regulations or controls adopted by the District or of other applicable laws of the State of Nebraska; c.) Applicant refuses to agree to the terms in Rule 17.24 and 17.25; d.) Well permit application includes any intentionally misleading or falsified data; e.) Well permit application fails to meet a minimum ranking score established by the Board of Directors; f.) Proposed use would not be a beneficial use of water for domestic, agricultural, manufacturing or industrial purposes; g.) In the case of a late permit only, the applicant did not act in good faith in failing to obtain a timely permit; h.) All permits shall be issued with or without conditions attached and approved or denied not later than sixty (60) days after receipt by the District of a complete and properly prepared application.

17.15. Hydrogeologic evaluation required. Any person who intends to modify any existing groundwater well or construct any new, helper or replacement groundwater well with an annual withdrawal of groundwater greater than 500 acre-feet, such person shall, in addition to the information and requirements for the well permit application in Rule 17.2, 17.3 and 17.4, provide the District with a hydrogeologic evaluation illustrating the impact, if any, from the intended withdrawal on the static water level of the aquifer and on local groundwater users.

17.16. Construction/withdrawal prohibited – The NRD Board of Directors reserves the right to deny any well permit application under this Section based upon the following: a.) Proposed water well is shown by the hydrogeologic evaluation and/or other data and information to have a reasonable short or long-term probability of adversely impacting the local aquifer and surrounding groundwater wells with a higher preference of use; b.) Hydrogeologic evaluation does not conform with accepted methods, or the data used does not adequately represent actual hydrologic and/or hydrogeologic conditions; c.) No waivers of liability have been obtained or provided by the well permit applicant; d.) Construction of the water well or increased groundwater withdrawal would violate any other provisions of these Rules and Regulations; e.) Application fails to meet the minimum criteria set forth in this rule.

17.17. Groundwater withdrawal. For purposes of this rule, groundwater withdrawal shall mean the total groundwater pumped, less any water returned to the aquifer through an injection well within one thousand (1,000) feet of the source.

17.18. Operations that return water to the aquifer must provide the District with evidence of compliance with federal, state, and local rules and regulations governing such activities.
17.19. Waivers of liability. Waivers of liability obtained from potentially impacted groundwater users will be considered by the District when determining whether to grant or deny a water well permit.
17.20. Flow meter required. All new and replacement water wells designed and constructed to pump greater than 50 gallons per minute, or existing groundwater wells modified to pump greater than 50 gallons per minute, must be equipped with a flow meter prior to groundwater withdrawal if any of the following conditions are met: a.) New or replacement high capacity wells approved after March 1st, 2014; b.) Proposed or modified existing water well is located within a designated Phase II or Phase III Groundwater Quality Management Area or meets the requirements set for in Rule 22 Groundwater Management Controls; c.) Allocations as outlined by Rule 22 become effective; d.) Any person with an approved permit that owns or controls land upon which a groundwater well is proposed to be constructed or groundwater withdrawal increased as provided in Rule 17.7.
17.21. Exempt wells. No permit shall be required for: a.) Test holes or dewatering wells with an intended use of ninety days or less; or b.) Single water wells designed and constructed to pump fifty (50) gallons per minute or less.
17.22. Permit no exemption from liability. The issuance of a permit by the District, as provided for in this Rule, should not be construed by the applicant to exempt him/her from any liability which may result from the withdrawal of groundwater.
17.23. When a permit is approved – the applicant shall commence construction of the water well as soon as possible after the date of the permit approval. The applicant shall have one (1) year after the permit approval date to complete construction of the well. If the applicant fails to complete the well under the terms of the permit, the District will cancel the permit.
17.24. Within eighteen (18) months after the water well registration filing date with the Department of Natural Resources, the applicant agrees to allow District staff to: a.) Collect a GPS (global positioning satellite) location coordinate of said well; b.) Collect and analyze a water sample from said well, in order to establish a benchmark nitrate-nitrogen concentration; c.) Measure the pumping rate from said well under normal operating conditions; d.) Measure static water levels from said well in the spring and fall.
17.25. The applicant agrees to allow the District to add the approved well or wells to the District's observation well monitoring network for collecting static water level measurement data as deemed necessary.
17.26. A permit issued shall specify all regulations and controls adopted by the District relevant to the construction or utilization of the proposed water well. The District shall transmit one copy of each permit issued to the Department, the permit applicant and the identified well contractor.

18. TRANSFER OF GROUNDWATER: CERTIFIED IRRIGATED ACRES, TYPE OF GROUNDWATER USE, OR CHANGE

18.1. Groundwater users intending to withdraw and physically transfer groundwater, transfer certified irrigated acres, transfer the type of use, or add/change a type of use of groundwater within the Management Area shall, before making any such transfer, apply for and be approved for the transfer by the Board. All applications will go before the Groundwater Management Committee once all the required documentation listed in this Rule are provided to the Staff. The Committee will review the application(s) quarterly. At the next regular scheduled Board meeting the Committee will make a recommendation to the Board to approve or deny the application.

18.2. The withdrawal and transfer of groundwater for domestic purposes is subject to Neb. Rev. Stat. § 46-691.01, and as such, will not be subject to Groundwater Transfer Rules.
18.3. The withdrawal and transfer of groundwater within the District solely for the purpose of providing water to range livestock will not be subject to Groundwater Transfer Rules.
18.4. Permanent or temporary (one time) transfers may occur only if the following conditions are met: a.) All transfers of groundwater or use must occur within the same Hydrogeologic Unit Code as defined by the United State Geologic Service (USGS) (Appendix 8) where the groundwater was originally withdrawn; b.) All transfers of certified irrigated acres must occur within the same Hydrogeologic Unit Code as defined by the United State Geologic Service (USGS) (Appendix 8) where the acres were originally certified; c.) Transfers may not occur in any sub-district or basin determined by the Board of Directors to be undergoing significant groundwater declines; d.) Transfers may not occur in any area the Board has determined to have groundwater quality issues; and e.) All transfers of groundwater use or acres must not be transferred to a section designated with a higher stream depletion factor in accordance with the best available data to the District.
18.5. Agricultural Transfers: After the effective date of these Rules, an agricultural user intending to withdraw and physically transfer groundwater off of the overlying land which he/she controls or transfer the certified irrigated acres shall, before making such transfer, apply for and be subject to Board approval for the transfer.

18.5.1. Agricultural transfers shall not exceed the historic consumptive use and/or the certified irrigated acres.

18.5.2. Agricultural transfers exceeding the historic consumptive use and/or the certified acres will require a variance from the District along with a specified offset for the increased consumptive use portion of the transfer.

18.5.3. Transfers may not occur in any sub-basin determined by the Board of Directors to be undergoing significant groundwater declines.

18.5.4. Transfers may not occur in any area that the Board has determined to have groundwater quality issues.

18.5.5. No transfers of groundwater use or acres will be transferred to a section designated with a higher stream depletion factor in accordance the best available data to the District.

18.5.6. The permanent transfer of certified irrigated acres may be accomplished by either decommissioning the well(s) or modifying it into a well(s) pumping fifty (50) gallons per minute or less: a.) If decommissioning the well a notice of abandonment form must be filed with the Department; b.) If modifying the well(s), a modification form must be filed with the Department.

18.5.7. The person transferring the acres must decertify the irrigated acres with the District, and the person to whom the acres are to be transferred must certify the acres to be irrigated with the District.

18.5.8. Transfers of certified irrigated acres off of land that is also served by surface water will not be permitted unless the surface water appropriation is relinquished for that parcel of land or an offset is provided to the District for the new acres to be irrigated.

18.6. Transfers of Type of Use: Any person who withdraws groundwater from a well located within the District and transfers the type of use of that water (e.g. irrigation to industrial) or adds a type of use of groundwater to the well (e.g. adds an industrial use to an existing irrigation well), shall apply for a transfer permit on forms provided by the District and before commencing the transfer, be granted a transfer permit.

18.6.1. No change in the type of use of groundwater shall be approved unless such change results in no increase in the historical consumptive use of the groundwater to be transferred or an offset is provided for any increase in historical consumptive use.

18.6.2. No transfer will be approved if the water use moves to another Section with a higher stream depletion factor as determined the best available data to the District.

18.6.3. No person shall use a groundwater well for purposes other than its registered purpose or until the groundwater well registration has been changed to the intended new use or the additional use has been added to the registration.

18.6.4. In the case of a replacement well, a person may modify and equip the original groundwater well to be used for range livestock, monitoring, observation, or any other non-consumptive or de minims use approved by the District.

18.6.5. The change to a new use or the addition of a use shall be made by filing a groundwater well registration modification with the Department and the change must be in conformance with Neb. Rev. Stat. §§ 46-609(1) and 46-651.

18.7. Municipal Transfer Permits: The District shall approve, without the filing of a District transfer permit application, the withdrawal and transport of groundwater when a public water supplier providing water for municipal purposes, so long as that water supplier submits a notification of permit application to the District. If a public water supplier files an application for a permit from the Department under the Municipal and Rural Domestic Ground Water Transfers Permit Act, the permit applicant shall advise the District of its filing.

18.7.1. Any variance approved by the Board for the public water supplier at any time before or during the permitting process shall be forwarded to the Department. Any condition of the variance approval shall be clearly stated, along with monitoring and/or compliance provisions.

18.7.2. When the Department initiates the consultation with the District regarding a permit application, the District shall advise the Department of any of the applicant's unmet obligations under District Rules (e.g. variance not yet applied for or granted)

18.8. Industrial Transfer Permits: Transfers for which permits or approval for transfer have been obtained pursuant to the Industrial Groundwater Regulatory Act are not required to apply for a transfer permit from the District. Commercial and Industrial users who are required to file for a permit from the Department under the Industrial Groundwater Regulatory Act shall advise the District of such application.

18.8.1. Any variance approved by the Board for the user at any time before or during the permitting process shall be forwarded to the Department. Any condition of the variance approval shall be clearly stated, along with monitoring and/or compliance provisions.

18.8.2. When the Department initiates the consultation with the District regarding a permit application, the District shall advise the Department of any of the applicant's unmet obligations under District Rules (e.g. variance not yet applied for or granted).

18.8.3. A water well construction permit shall not be issued until the industrial transfer permit has been obtained from the Department and a copy of the permit is on file with the District.

18.9. Transfer Out of District: Requests for transfer of groundwater out of the District pursuant to Neb. Rev. Stat. § 46-613.01 shall require District action to approve or deny the transfer request prior to submission of the required transfer permit application to the Department.

18.9.1. When the Department initiates the consultation with the District regarding a permit application, the District shall respond according to the following provisions: a.) District shall advise the Department of any of the applicant's unmet obligations under District rules (e.g., variance not yet applied for or granted); b.) Any formal action taken by the Board adopting any offset determined by the Department or the District to be necessary to maintain compliance with any formal agreement or to mitigate any effects to surrounding groundwater users or surface water appropriators for uses other than municipal or industrial/commercial; c.) If the District determines an offset on behalf of the user, the nature of the offset and of the enforcement provisions that will be required; d.) Groundwater well construction permit shall not be issued until a permit to transfer groundwater to an adjoining District has been obtained from the Department and a copy of the permit is on file with the original District.

18.9.2. Application for and Approval of Transfers: In accordance with Neb. Rev. Stat. § 46-739(k) the District may deny or condition its approval of any transfers to the extent such conditions are necessary to: a.) Ensure the consistency of the transfer with the purpose or purposes for which the management area or sub-district was designated; b.) Prevent adverse effects on other groundwater users or on surface water appropriators; c.) Prevent adverse effects on the state's ability to comply with an interstate compact or decree or to fulfill the provisions of any other formal state contract or agreement; and d.) Otherwise protect the public interest and prevent detriment to the public welfare.

18.9.3. In making its decision regarding a transfer application, the Board may consider relevant information, including but not limited to: a.) Information obtained from studies within the sub-district; b.) Whether the proposed use is a beneficial use of groundwater; c.) Alternative sources of surface water or groundwater available to the applicant for the proposed withdrawal, transport, and use; d.) Any negative effect of the proposed withdrawal, transfer and use on groundwater or surface water supplies needed to meet reasonable future demands for water within the State; e.) Groundwater quality of the area being transferred to; f.) Whether the proposed withdrawal, transfer, and use is consistent with the goals and objectives of the integrated management plan; g.) Trends in the change of groundwater levels in the sub-basin; h.) Other transfers into the area in proximity to the well proposed to be used; i.) Total usage in proximity to the well proposed to be used; and j.) Other factors that would increase the rate of consumptive use in the area of the well proposed to be used.

18.10. An application for a transfer shall include, but not be limited to the following: a.) Names and addresses for each landowner involved in the proposed transfer and the name and address of the operator if different than the landowner; b.) Legal description of the land involved in the proposed transfer along with well registration numbers of all wells proposed to be used; c.) Nature of the proposed use, including whether the transfer is temporary or permanent; d.) Current rate of withdrawal from all wells proposed to be used and the maximum proposed amount of withdrawal from the source well; e.) Identification of any other alternative sources of surface water or groundwater available to the applicant for the proposed use and the reasons why use of such alternative source or sources are not being sought; f.) Proof of ownership from the FSA or County Assessor for each certified acre to be involved in the transfer request; g.) An assessment of the effects of the proposed withdrawal, transfer, and use on existing groundwater users, on existing surface water appropriators, and on groundwater and surface water supplies needed to meet present or reasonable future demands within the State; h.) Assessment of the effects of the proposed withdrawal, transfer, and use on the environment in the vicinity of the proposed withdrawal and proposed use; i.) Any other information the applicant deems relevant to

the District's criteria for approval of the proposed withdrawal, transfer, and use; j.) Signatures from all of the landowners involved; k.) Aerial photograph(s) showing all certified acres involved in the transfer.

18.11. Nothing contained in Groundwater Transfer Rules is intended or shall be construed as: a.) Permitting the development of any new well with adequate offset; b.) Prohibiting a person from pursuing a variance from these Rules and Regulations.

19. FLOW METERS

19.1. Water Well Permit Condition for Requiring Flow Meters on Wells. The Lower Niobrara Natural Resources District Board of Directors recognizes the need for improved groundwater use data throughout the District. Therefore, except as specified in Section 19.2.1, as a condition of District approved well permits, and as described in this Rule the proper installation and maintenance of flow meters shall be required on wells constructed within the District; the reporting of data from these flow meters shall be required from ground water users; and, finally, District staff and/or their representatives shall be authorized to perform inspections of these flow meters. [Neb. Rev. Stat. §46-707 (2) and (3)]

19.2. Flow Meters Required on Wells. This section describes the situations under which the District will or will not require flow meters on water wells. Local, state and federal requirements for flow meters may differ from District requirements.

19.2.1. Any water well permit issued by the District on or after March 1 2014, shall include a condition requiring the owner to equip the well(s) with a District approved flow meter prior to groundwater withdrawal, except for the following: a.)Inactive Status Well – a flow meter shall not be required for any water well that is registered with the Nebraska Department of Natural Resources as an 'inactive' status well. A flow meter shall be required when the registration of a water well with the Department is modified from 'inactive' to 'active' status. b.) Combined Wells – groundwater withdrawals from water wells that are connected by a common pipeline may be measured by one flow meter provided the total groundwater withdrawal is measured.

19.3. Groundwater User Responsible for Flow Meter Care. It shall be the duty of groundwater users to ensure that each flow meter installed to comply with this Rule is fully functional, properly maintained and in good working condition.

19.4. Maintain Flow Meter Integrity. It shall be a violation of these Rules and Regulations for any person to willfully damage, alter, remove, reset, adjust, manipulate, obstruct, or in any manner interfere with or tamper with any flow meter required under this Rule for the purpose or with the intent of producing an incorrect, inaccurate or misleading measurement, or to cause, procure or direct any other person to do so.

19.5. Sealing of Flow Meters. Flow meters installed to comply with this Rule may be sealed by the District to discourage/prevent tampering. Such a seal may not be removed without written approval of the District, except that written permission shall not be required prior to breaking such seal for the emergency situation in which a malfunctioning flow meter prevents a groundwater user from being able to use their well for its intended beneficial use, and the District seal must be broken in order to correct the emergency situation, if the groundwater user has made a good faith effort to contact the District, but cannot do so. Any groundwater user who breaks the District's seal under the emergency situation described above must inform the District in writing within five (5) working days of breaking such seal.

19.6. Flow Meter Inspection. Flow meters installed to comply with this Rule 19 may be periodically inspected by District staff or their representative for proper readings and operation. The District shall provide landowners written notification of this inspection. The District will have 30 days from the postmarked date of this notification to perform the inspection, and shall report the results of the inspection to the landowner. It is the intent of the Board that a reasonable attempt be made to contact a landowner to schedule this inspection or any other inspection performed pursuant to Rule 19 of these Rules and Regulations.

19.7. Flow Meter Specifications and Installation Requirements. Any flow meter installed to comply with these Rules must be selected from a list approved by the District, and must meet or exceed the following minimum specifications, except for public water supply wells regulated under the Nebraska Department of Health and Human Services Title 179, Chapter 22:

19.7.1. List of Approved Flow Meters. The District will maintain a list of flow meter models and/or brands that are approved for use in the District for the purposes of this Rule that meet or exceed the following specifications. This list may be viewed in the District Office at 410 Walnut Street, Butte, NE. This list may be updated periodically by the District.

19.7.2. Written Installation, Operation and Maintenance Procedures. The meter manufacturer must have detailed written instructions for the installation and operation of the flow meter and for the frequency and methods for maintaining the flow meter.

19.7.3. Accuracy. Flow meters must be accurate to within plus-or-minus two percent (+/-2%) of the flow meter reading.

19.7.4. Flow Meter Display. Total Volume of Flow (Totalizer), acre-inches. Flow meters shall have a clearly readable indicator to record and display the total volume of groundwater withdrawal, which shall measured in units of acre-inches, and shall clearly and visibly display any multiplier needed to convert the meter reading to the correct total volume of groundwater withdrawal. The totalizer shall be non-resettable.

19.7.5. Totalizer Recording Capacity. Each flow meter totalizer shall have sufficient range to record the Lower Niobrara Natural Resources District Proposed Quantity Subarea total volume of water expected to be withdrawn over at least a one year period.

19.7.6. Flow Meter Sizing. Flow meters shall be installed and calibrated to pipe size so the expected flow rate and pressure are within the manufacturer's design parameters for the flow meter. The meter size, serial number and the direction of flow shall be clearly stamped on the body of the meter. The inside pipe diameter for which the meter has been calibrated shall be clearly shown on the meter to the nearest 0.001 of an inch.

19.7.7. Protection from Elements. Flow meters, especially the register and meterhead, shall be protected from the weather, livestock, and other potential sources of damage to the meter.

19.7.8. Installation. Flow meters and any appurtenances shall be installed according to the manufacturer's specifications to ensure accurate operation. Flow meters shall be positioned so there is a length of pipe upstream of the flow meter that is no less than the equivalent of five (5) pipe diameters from any valve, elbow, or any other source of turbulent flow, or as recommended by the manufacturer. There shall also be unobstructed flow for a length of pipe downstream of the flow meter that is equal to at least one (1) pipe diameter. The flow meter shall also be placed in such a manner the pipe, including the flow meter and the necessary upstream and downstream lengths of pipe, will have a full flow of water.

19.7.9. Reporting Flow Meter Installation. Groundwater users shall report the installation of a flow meter to the District, on a form provided by the District, within 30 days of installation of the flow meter.

19.7.10. District Inspection and Report. District shall inspect flow meters for proper installation and operation. The District shall perform this inspection within 30 days of receiving a report of installation without written notice to the landowner. The District shall report the results of the inspection, including any corrections required for proper installation of the flow meter, to the landowner.

19.7.11. Flow Meter Maintenance and Repair. Groundwater users shall ensure the good working condition of flow meters, and shall be responsible for maintenance of flow meters and for repair or replacement of a malfunctioning or improperly installed flow meters.

19.7.12. Maintenance Schedule. Flow meter maintenance shall be scheduled and performed according to the manufacturer's recommendations.

19.7.13. Operating Conditions. Each flow meter shall be kept in good working condition and clear of debris and other material or objects that could interfere with the inspection, operation, and performance of the flow meter.

19.7.14. Malfunctioning Flow Meter. Any malfunctioning flow meter must be reported to the District within five (5) working days following its discovery. The groundwater user shall report to the District the totalizer reading before repairing the meter on-site or removing the flow meter for repair on a form provided by the District. The District shall provide written notice the report was received.

19.7.15. Flow Measurement While Meter is Being Repaired. District may provide a temporary flow meter, if the District has suitable equipment available, or some other means of measuring groundwater withdrawal while a flow meter is being repaired.

19.7.16. Certification of Flow Meter Repair. Persons or companies that repair and/or calibrate any flow meter installed under these Rules and Regulations shall certify in writing the repaired or calibrated flow meter meets the manufacturer's original specifications, and the groundwater user shall provide the District with a copy of that certification. The District shall provide written notice the certification was received.

19.8. Reports. Groundwater users shall annually submit a report of groundwater withdrawal to the District on a form provided by the District. The report must be postmarked or otherwise submitted to the District by March 15th of the following year. If March 15th is a non-business day, the report must be postmarked by the next following business day. Operators in a Phase II area can meet this requirement by submitting a Phase II report in compliance with Rule 14.6.2. Failure to properly install and maintain a flow meter, to provide the necessary reports to the District or to comply with the other provisions of this Rule 19 shall be a violation of these Rules and Regulations.

20. VARIANCES

20.1. The Board of Directors may grant variances from the strict application of these Rules and Regulations upon good cause shown.

20.2. An application for a variance shall be made on forms provided by the District and the application will be acted upon by the Variance Committee. The applicant or his/her representative shall be present at the Variance Committee meeting. With prior notification to the District, written testimony may be provided if the applicant cannot be present.

20.3. An applicant shall pay a non-refundable variance fee of $300.00 due at the time of making application prior to meeting with the committee.

20.4. The 8-member Variance Committee meets with all individuals who request a variance from the Rules and Regulations of the Board. The Committee reports to the Board at the regular Board meeting. The variance requests are reviewed by the Board and placed on the agenda for the next regular Board meeting for decision.

20.4.1. The Manager will distribute all information concerning the variance to the Committee, all other Board members, and person(s) requesting the variance.

20.4.2. The Manager will set the time to hear the variance request with the Committee.

20.4.3. The Board, at its discretion, may designate conditions under which specific requests for a variance may be approved by methods other than the Variance Committee process. A variance granted under these conditions shall be referred to as an "expedited variance.

20.5. An expedited variance shall be applied for using forms provided by the District. An expedited variance may be granted by the Variance Committee upon approval of the Board, or their designated representative, for the purpose of approving an expedited variance for:

20.5.1. Well permits which expired during the 180 Day Stay approved by the Board at the August 5th, 2013 regular scheduled meeting.

20.5.1.1. Permit holders may apply for a variance on a form provided by the District.

20.5.1.2. A meeting date will be set to meet with the applicant and review the application.
20.5.1.3. If the application is approved, the number of days lost because of the Stay will be added to the permit, a minimum of 30 days will be added.
20.5.1.4. Permits expiring within 30 days of the end of 180 Day Stay may also apply for an extension and may be granted up to the number of days from end of the Stay to the expiration date on the well permit.
20.5.1.5. The variance fee and additional well permit fee will be waived.

21. USE OF LAGOON WATER FOR IRRIGATION

21.1. Lagoon water may be applied through an irrigation system to acres not certified to groundwater or surface water when:

21.1.1. There is a significant weather rain event that puts the lagoon at a point of water elevation that jeopardizes the integrity of the structure or puts it to a must-pump status according to their Nutrient Management Plan filed with the Nebraska Department of Environmental Quality; and
21.1.2. The total application of lagoon water is less than 3 acre-inches per acre per year to a field; and
21.1.3. A map indicating the amount of acres and location of those acres is on file with the District; and
21.1.4. Proper management of the lagoon has been followed according to the Nutrient Management Plan filed with the Nebraska Department of Environmental Quality; and
21.1.5. The District has been notified prior to operation and agrees the requirements of these Rules have been met.

21.2. Concern not covered in 21.1 can be brought before the District Variance Committee for resolution.

22. GROUNDWATER MANAGEMENT CONTROLS

22.1. The Lower Niobrara NRD has established triggering mechanisms for groundwater quantity protection. These triggers are activated when certain conditions are detected by the NRD Groundwater Quantity Monitoring Program. The triggers are intended to be protective measures that will initiate actions before serious problems occur. Once a trigger is activated, the NRD will begin a series of actions including the delineation of sub-areas, called Action Levels, and establish controls, including the required use of Best Management Practices, to protect groundwater supplies or remediate existing problems.

22.2. Triggers for groundwater quantity protection consist of several phases, called action levels, which respond to worsening conditions with increasingly rigorous corrective measures. Each action level has its own triggering mechanism, so that changing conditions will trigger new action levels.

22.3. Flexibility has been built into the triggers and action levels because of the complex hydrogeology of the District. The current triggers and actions are used for the entire District, which may be too protective in some areas and may under-protect other areas. As our knowledge of the District's hydrogeology increases, the triggering mechanisms and actions will be 'fine-tuned' to improve the effectiveness of our groundwater quantity protection efforts. The Lower Niobrara NRD will develop unique triggers and actions for different regions of the District as more local hydrogeologic information becomes available.

22.4. Emergency action can be taken by the Board in the event the water supply does not meet the requirements set forth in 2.2. These actions may include, but are not limited to: a.) Meet with of all affected user and/or landowners in the area or sub-basin; b.) Establish extent of area or sub-basin affected; c.) Mitigate workable solutions; d.) Establish short term allocations for all users in affected area or sub-basin; e.) Other actions needed to mitigate a solution.

22.5. Action Level 1 Sub-Areas will require the District to increase educational efforts in the area, form a local Citizen’s Advisory Committee, and conduct a study to determine the extent of the problem. Action Levels 2 and 3 will require groundwater users to perform certain actions.

22.6. Prior to the formation of an Action Level 2 or 3 Sub-Area, the District will amend these Rules and Regulations as needed, and will hold at least one (1) public hearing to consider adopting the amendments and to consider the formation of the Sub-Area as required by law.

22.7. The following criteria and controls will be used to trigger, delineate, and treat Action Level Sub-Areas:

22.8. Action Level 1: The District will initiate the following actions when, in 2 years out of any 3 year period, the spring groundwater level of any well(s) in the routine Groundwater Quantity Monitoring Program drops 5% of the average saturated thickness of the primary aquifer of a Sub-Area or District average from the spring average levels of 1995. When this trigger is actuated, the NRD will take the following actions:

22.8.1. Intensify educational efforts in the area including, but not limited to, information concerning: a.) Groundwater conservation practices; b.) Potential regulatory actions of the 2nd and 3rd Action Levels (see below); c.) Form a local Citizen's Advisory Committee; d.) Increase the number of wells monitored in the area to determine the extent of the problem, to serve as a basis for triggering Action Level 2, and to obtain the hydrogeologic information necessary to delineate an Action Level 2 sub-area. The intensified monitoring program described below applies to the entire District. The actual monitoring program for each problem area may vary according to the local hydrogeologic characteristics of the area.

22.8.2. The District will determine a rudimentary area to be monitored. The shape and size of the area may change as more information is gathered. A minimum area of 9 square miles will be monitored.

22.8.3. The minimum number of monitoring sites will be 50% of the number of registered irrigation wells in the area that are suitable for use as groundwater level observation wells (taking into account criteria such as quality of well construction and screened intervals). The District will also consider using registered industrial, livestock, monitoring, observation, public water supply, and domestic wells that would be suitable as monitoring sites.

22.8.4. The intensified monitoring will begin no later than the spring after the trigger was actuated for Action Level 1.

22.8.5. Determine the necessary control measures, Rules and Regulations for Action Levels 2 and 3.

22.9. Action Level 2: An area will be placed into Action Level 2 when the spring groundwater levels in 80% of the wells monitored in the intensified monitoring program conducted in Action Level 1 drop 5% of the average saturated thickness of the primary aquifer of a Sub-Area or District average from the spring average levels of 1995 in those wells for 3 years out of any 4 year period of time. The area affected by this drop must be a minimum of 9 square miles in size.

22.9.1. The District will actively seek public opinion while amending the Rules and Regulations for the Sub-Area. Information from Action Level 1 will be utilized in amending the Rules and Regulations. Prior to the formation of an Action Level 2 Sub-Area, the District will hold at least one (1) public hearing to consider the adoption of the amendments and the formation of the sub-area as required by law.

22.9.2. The District shall require volume metering of wells used for any one or more of the following categories of groundwater use: municipal, agricultural, manufacturing, commercial, or industrial. The District will also require owners of these wells to submit to the District an annual report of the amount of water pumped.

22.9.3. Additionally, the District will choose at least one of the following authorized controls: a.) Allocate groundwater withdrawal on an acre-inch basis, specifying the total number of acre-inches of irrigation water per irrigated acre per year or an average number of acre-inches of irrigation water per irrigated acre over any reasonable period of time not to exceed five years; b.) Adopt a system of rotation of use of groundwater by utilizing a recurring series of use and nonuse of irrigation wells on an hourly, daily, weekly, monthly basis or yearly basis; c.) Adopt well spacing requirements more restrictive than statutory well spacing requirements; c.) Require the reduction of irrigated acres, where the nonuse of irrigated acres will be a uniform percentage reduction of each landowner's irrigated acres; d.) Require irrigation scheduling; e.) Adopt other reasonable regulations to protect the quantity of groundwater in the Sub-

Area; f.) District will also continue the educational efforts and the groundwater level monitoring of Action Level 1.

22.10. Action Level 3: An area will be placed in Action Level 3 when the spring groundwater levels in 80% of the wells monitored in Action Level 2 drop 10% of the average saturated thickness of the primary aquifer of a Sub-Area or District average from the spring average levels of 1995 in those wells for 3 years out of any 4 year period of time. The area affected must be a minimum of 9 square miles in size. The District may also declare an Action Level 3 when the Director of the Department makes a final determination that all or part of the District is fully appropriated under Neb. Rev. Stat. § 46-713.

22.10.1. Prior to the formation of an Action Level 3 sub-area, the District will hold at least one (1) public hearing to consider the adoption of any amendments to the Rules and Regulations and the formation of the sub-area as required by law.

22.11. In addition to the controls of Action Level 2, the District may require any of the following controls for an Action Level 3 sub area: a.) Require the use of tensiometers, soil moisture blocks, or other irrigation scheduling devices; b.) Require annual reports with water level measurements and quantifying the total withdrawal from wells; c.) Close the area to the issuance of any additional new well permits for a period of one (1) year; d.) District will also continue the educational efforts and the groundwater level monitoring of the first two Action Levels.

23. WATER BANKING

23.1. The District will develop water banking Rules and Regulations when the opportunity arises for the District to have available water from the retired certified acres or retired surface water allocation.

24. CHEMIGATION

24.1. **Authority:** These rules and regulations are adopted pursuant to the authority granted in Neb. Rev. Stat. §§46-701-754, the Nebraska Ground Water Management and Protection Act, and Neb. Rev. Stat. §§46-1101-1148, the Nebraska Chemigation Act.

24.2. **Definitions:**

24.2.1.1. Applicator shall mean any person engaged in the application of chemicals by means of chemigation. Applicator shall include any person operating equipment used for chemigation whether for himself or herself or on behalf of the permit holder for the land on which the chemigation will take place.

24.2.1.2. Chemical shall mean any fertilizer, herbicide, or pesticide mixed with the water supply.

24.2.1.3. Chemigation shall mean any process whereby chemicals are applied to land or crops in or with water through an on farm irrigation distribution system.

24.2.1.4. Council shall mean the Environmental Quality Council.

24.2.1.5. Department shall mean the Department of Environmental Quality.

24.2.1.6. Director shall mean the Director of Environmental Quality.

24.2.1.7. District shall mean Lower Niobrara Natural Resources District

24.2.1.8. Fertilizer shall mean any formulation or product used as a plant nutrient which is intended to promote plant growth and contains one or more plant nutrients recognized by the Association of American Plant Food Control Officials in its official publication.

24.2.1.9. Injection location shall mean each site where chemicals will be applied through an irrigation distribution system.

24.2.1.10. Irrigation distribution system shall mean any device or combination of devices having a hose, pipe, or other conduit, which connects directly to any source of ground or surface water, through which water or a mixture of water and chemicals is drawn and applied for agricultural or horticultural purposes. Irrigation distribution system shall not include any hand-held hose sprayer or other similar device which is constructed so that an interruption in water flow automatically prevents any backflow to the water source.

24.2.1.11. Open discharge system shall mean a system in which the water is pumped or diverted directly into a ditch or canal in such a manner that the force of gravity at the point of discharge into the ditch or canal cannot cause water to flow back to the point from which the water was pumped or diverted.
24.2.1.12. Permit holder shall mean the owner or operator of land who applies or authorizes the application of chemicals to such land by means of chemigation. The permit holder shall be the party primarily responsible for any liability arising from chemigation on the property.
24.2.1.13. Pesticide shall mean any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, insect, rodent, nematode, fungus, weed, or other form of plant or animal life or virus, except viruses on or in living humans or animals, and any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.
24.2.1.14. Restricted Use Pesticide shall mean those determined by the Council, Department of Natural Resources, or the EPA safe for application only when applied by or under the direct supervision of trained and certified applicators.
24.2.1.15. Working day shall mean Monday through Friday but shall not include Saturday, Sunday, or a federal or state holiday. In computing two working days, the day of receipt of the permit is not included and the last day of the two working days is included.

24.3. **Chemigation Application:**

24.3.1. No person may chemigate land or crops unless such person obtains authorization, via permit, from the District.
24.3.2. No permit is required to pump or divert water to or through an open discharge system.
24.3.3. Each injection location must be permitted on an annual basis, using forms provided by the District.
24.3.4. Each permit expires on June 1 of each year, and the permit holder is solely responsible for renewal.
24.3.5. An application for a chemigation permit shall be considered received by the District on the date it is either hand delivered or received by mail, so long as the application is properly completed as per Nebraska Administrative Code Title 195, signed by the permit holder, and the permit holder has paid the requisite fee (see Section 24.10: Chemigation Permit Fee Schedule).
24.3.6. Any incomplete, unsigned, or unpaid applications will be returned to the applicant.
24.3.7. Required information includes: a.) Name; b.) Complete address; c.) Phone number (residence or cell); d.) Legal description; e.) Type of permit; f.) Type of injection unit; g.) Certified Chemigation Applicator including; name, certification number and expiration date; h.) Signature of Certified Applicator if different from name on application; i.) Fertilizer name or formulation including total amount applied (if applied through system); j.) Pesticide name and total amount applied (if applied through the system); k.) Total number of acres treated (if a renewal permit); l.) Signature of permit applicant and date.

24.4. **Certification:**

24.4.1. Pursuant to Title 195, Chapter 13, Nebraska Department of Environmental Quality, all chemigation applicators must undergo and maintain certification. Training programs shall be offered through the University of Nebraska Cooperative Extension Service. The director shall issue a certificate acknowledging the competency, determined through the use of a written examination prepared and administered by the department. Each applicator's certificate, shall be valid for a period of four years, and shall expire on January 1 of the fourth year after the date of issuance.
24.4.2. [INCLUDE WHETHER DISTRICT WILL NOTIFY OF CERTIFICATION EXPIRATION; INFORMATION ON LOCATION OF TRAINING; ANY ADDITIONAL REPORTING REQUIREMENTS]

24.5. **Original Permit Process**

24.5.1. The District shall review each completed permit application, conduct an inspection, and approve or deny the application within 45 days after the application is filed.

24.5.2. No chemigation permit, except a Special permit, shall be issued or renewed by the district, if any of the following conditions occur: a.) The applicant has failed to provide the required information, as specified in Title 195, Chapter 2, 002, Nebraska Department of Environmental Quality on the application form; b.) The irrigation distribution system does not comply with the equipment standards set forth in Title 195, Chapters 9 and 10, Nebraska Department of Environmental Quality; c.) The applicator has not been certified as a chemigation applicator by the Department; or d.) Failure of the applicant to remit the appropriate fee

24.5.3. Changes in application information shall be provided to the District within 10 days.

24.5.4. [INCLUDE ANY OTHER REASONS DISTRICT MAY DENY; REPORTING INFO REQUIRMENTS]

24.6. **Renewal Process**

24.6.1. All permits must be renewed annually. If a renewal form has not been completed and filed with the requisite fee (see Section 24.10: Chemigation Permit Fee Schedule), the permit shall not be renewed without filing an original application. Since permits expire on June 1, all renewable applications must be on file with the District by June 1. Each application for renewal is subject to inspection of equipment and site to determine compliance with the Chemigation Act and these rules and regulations. If an inspection reveals noncompliance, renewal shall be refused, suspended, or revoked until compliance is achieved, as determined by the District. Under no circumstances may a permit be transferred.

24.6.1.1. All renewals will be inspected every other year: a.) Renewals in even ranges (6,8,10,12,14,16,18,20,22) will be inspected in odd number years (example 2013), b.) Renewals in odd ranges (7,9,11,13,15,17,19,21)will be inspected in even number years (example 2014).

24.6.1.2. If the system failed the inspection the previous year and not re-inspected it will be considered the same as a new permit

24.6.1.3. [EXPAND UPON DISTRICT'S FACTORS FOR INSPECTIONS OR DETERMINING COMPLIANCE]

24.7. **Special Permits**

24.7.1. If the chemigation system does not need all the safety equipment, as determined by District inspection, the District shall forward such information to the Department for review. If the Department agrees with the District's inspection, the Department shall grant the District authority to issue a special permit. [INCLUDE REQUIRED EQUIPMENT OR INSPECTION REQUIRMENTS]

24.8. **Emergency Chemigation Permit Approval**

24.8.1. A person may file an application for an emergency permit as established in Title 195, Chapter 6, Nebraska Department of Environmental Quality. The District shall have two working days to review the permit before issuing or denying. "Two working days" shall mean Monday through Friday, but does not include Saturday, Sunday, or a federal or state holiday. The day the District receives the permit application is not included in the two working days. On the second working day, the District shall complete its review and either issue or deny the permit. If the District has not denied the permit within two working days, the permit shall be deemed issued.

24.8.2. Emergency permits shall be valid for a period of forty five (45) days from the date of issuance. Any holder of an emergency permit or an applicator applying chemicals pursuant thereto who violates any of the provisions of the Nebraska Chemigation Act or standards, rules and regulations adopted under it, shall have such permit automatically revoked by the district or the Department, without a hearing and shall be guilty of a Class II misdemeanor [INCLUDE DISTRICT REASONS FOR GRANTING PERMIT]

24.9. **Permit Revocation**

24.9.1. The District shall suspend any and all permitted chemigation systems if there is an actual or imminent threat of danger to the public or environment due to the operation of the chemigation system.

24.9.2. The District shall suspend or deny any and all permits if: a permit was obtained fraudulently; a permit holder fails to notify the district of equipment replacement or alteration within seventy-two hours; Applicator or permit holder fails to notify the District and Department of actual or suspected spill

or accident within 24 hours; Permit holder fails to carry out cleanup measures developed by the Department within the time specified.

24.9.3. Should a violation of the Nebraska Chemigation Act or rules and regulations promulgated pursuant to the Act occur, the District shall notify the person in violation. a.) The violator has 10 days to remedy the violation or request a hearing before the District's Board of Directors; b.) If the violation has not been corrected in the 10-day period, the District shall notify the Department of the violation; c.) If after a preliminary investigation, the Department determines there is a violation, then the person's permit shall be revoked until compliance is met; d.) For systems operated by a permit holder, the District may, but shall not be required to, establish a compliance schedule in lieu of the 10-day compliance deadline.

24.9.4. [PROVIDE COMPLIANCE SCHEDULE]

24.10. **Chemigation Permit Fee Schedule**

24.10.1. As required by Title 195, Chapter 3, Nebraska Department of Environmental Quality, the District shall review applications, conduct inspects, and approve or deny permits. No permit may be approved without payment of the requisite permit fee, which shall reflect the cost of administration and inspections.

24.10.1.1. An original application fee of $50.00 (not to exceed $150) for each new permit shall be paid to the District, of which $5.00 shall be paid to the Department of Environmental Quality.

24.10.1.2. A new special permit application fee of $50.00 (not to exceed $150) shall be paid to the District, of which $5.00 shall be paid to the Department of Environmental Quality.

24.10.1.3. The special permit renewal and annual renewal fee of $30.00 (not to exceed $100) shall be paid to the District, of which $2.00 shall be paid to the Department of Environmental Quality.

24.10.1.4. An emergency permit application fee of $100.00 (not to exceed $500) shall be paid to the District, of which $10.00 shall be paid to the Department of Environmental Quality.

24.11. **Inspections**

24.11.1. District and Department employees shall have reasonable access to inspect all chemigation systems and to otherwise carry out their duties pursuant to the Act; specifically, Neb. Rev.Stat. § 46-1124. The District shall conduct an inspection of each injection location for which the permit is sought in order to ensure compliance with the equipment standards set forth herein and in Title 195, Chapters 9 and 10, Nebraska Department of Environmental Quality.

24.11.2. The District shall conduct an inspection of replaced or altered equipment and shall approve the continuance of chemigation so long as the inspected equipment is deemed to be in compliance with the Act. The District shall not collect a new fee for an inspection of previously approved injection locations.

24.11.3. Timing of inspections: a.) Inspections for original applications shall be conducted within 45 days of filing, b.) Inspections for special permits shall be conducted prior to permit renewal, c.) Inspections for an emergency permit shall be conducted during the 45 day effective period if no inspection was conducted prior to the permit issuance, d.) The District has the right to inspect any location up for renewal to determine compliance. Should an inspection determine noncompliance with the Act, the District shall refuse the application until compliance with the Act is demonstrated.

24.11.3.1. The District will contact the operator to confirm an inspection appointment.

24.11.3.2. The operator must be present to start and stop the system (District personnel will not start or stop any systems).

24.11.3.3. The District inspector will use the following procedures for inspection: a.) Visiually check to determine if all the required equipment is in the proper location; b.) With the operators assistance remove the chemical injection valve and test to determine it holds at least 10 psi and replace in system; c.) Operator will start the system and bring it to normal operating pressure; d.) District inspector will check low pressure drain for proper operation; e.) Operator will shut down the system; f.) District inspector with operators assistance remove inspection port to determine if the mainline check valve is

functioning properly; g.) District inspector will determine if the irrigation pump and chemigation pump are interlocked (It will be the operators responsibility to make any electrical connections to prove the interlock system); h.) The District inspector will deny the permit if any of the requirements are not met.

24.11.4. The District will investigate all systems which have been reported to the District to confirm if they are chemigating and/or set-up to chemigate.

24.11.5. The District will spot check system with un-renewed permits to insure they are not being used to chemigate.

24.11.6. All new and existing system in the district are subject to spot checks by the District staff to insure they are not chemigating without a permit.

24.11.7. If a site is found to be setup for chemigation and/or is chemigating and does not have a current permit the land owner will be contacted and requested to permit the system. If they do not comply within five (5) days they will be subject to Rules 8 through 12.

24.11.8. [INCLUDE INSPECTION DISTRICT PROCEDURE--NOTICE, ACCESS, LIABILITY]

24.12. **Equipment**

24.12.1. Irrigation distribution systems with chemigation capabilities shall be equipped with the following devices: a.) Mainline Check valve; b.) Vacuum relief valve; c.) Inspection port; d.) Low pressure drain including a twenty feet (20) one (1) inch drain hose; e.) Chemical injection line check valve; f.) Simultaneous interlock device.

24.12.2. Design configuration of all equipment shall be in compliance with Title 195, Chapters 9 &10, Nebraska Department of Environmental Quality and any rules and regulations promulgated by the District.

24.12.3. All permit holders shall maintain the above listed equipment in good working condition at all times of chemigation.

24.12.4. [INCLUDE ALL EQUIPMENT, DESIGN, ANY DISTRICT REPORTING/INSPECTION REQUIREMENTS—INCLUDING THAT RELATED TO SUBSURFACE DRIP IRRIGATION]

24.13. **Posting**

24.13.1. All permit holders shall post signs on chemigated fields when using any herbicide or pesticide, or a chemical for which the label requires posting. A sign with the words, “KEEP OUT, CHEMICAL APPLICATION THROUGH IRRIGATION WATER SYSTEM” shall be posted by the permit holder at each point of entry into the treated area, adjoining farmstead, or residential area, along any public road where public exposure may occur, and at the point of chemical inject if such point is outside the treated area. The signs shall conform to District rules and regulations as well as Title 195, Chapter 12, 002.04, Nebraska Department of Environmental Quality.

24.13.2. [INCLUDE DISTRICT RULES AS TO SIZE OF SIGN, LOCATIONS, RESPONSIBLE PARTY, ETC.]

24.14. **Enforcement**

24.14.1. The District shall enforce the provisions of Neb. Rev. Stat. §§ 46-601, 46-602.01, the Groundwater Management and Protection Act, the Nebraska Chemigation Act, and all its own orders and rules and regulations adopted pursuant thereto through the issuance of a formal notice of an alleged violation, cease and desist orders issued and enforced against operators or landowners, as determined by the Board of Directors, and/or by bringing an appropriate action in the district court in the county where the violation occurs for the reasons and by the procedures as follows. The District shall give 3 days’ notice to the affected person and an opportunity to be heard before issuing a cease and desist order to enforce the Ground Water Management Protection Act or the Chemigation Act.

24.14.2. The District shall make reasonable efforts to obtain voluntary compliance before compelling compliance through the legal system.

24.15. **Reporting**

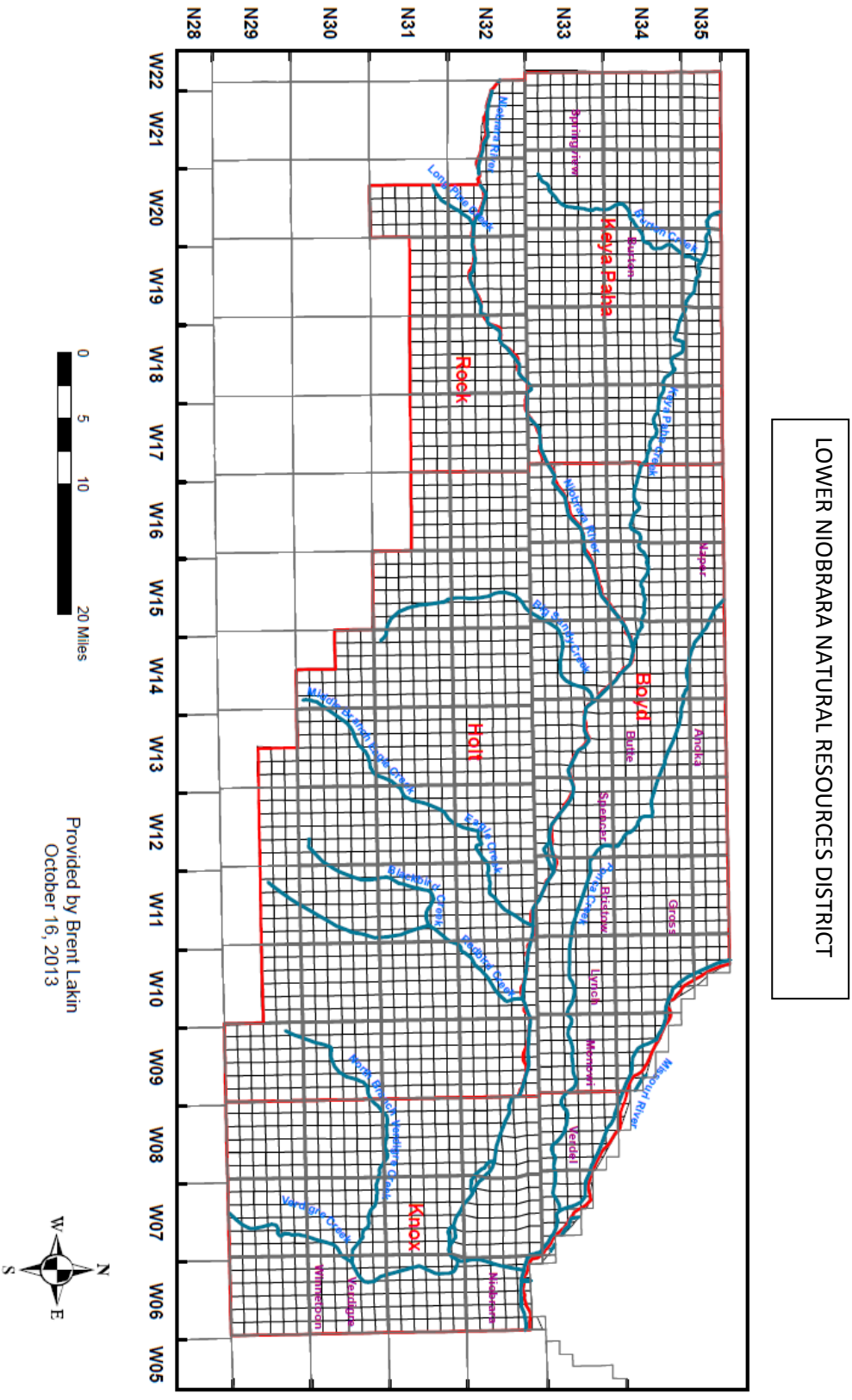
24.15.1. A permit applicant shall notify the District within ten days of any changes in the information provided on the permit application.

24.15.1.1. [INCLUDE CONSEQUENCES FOR FAILURE TO REPORT]

24.15.2. Permit holders shall notify the District and the Department of any actual or suspected accident resulting from the use of chemigation. Failure to do so may result in a civil penalty of not more than five hundred dollars or a guilty verdict of a Class III misdemeanor. Permit holders shall note the District and Department consider each day a single, separate violation.

24.15.3. Permit holders who either replace or alter or authorize such replacement or alteration of chemigation equipment previously approved by the District shall notify the District within ___ hours of such replacement or alteration. The District shall conduct an inspection of the replaced or altered equipment.

APPENDIX 1: – MAP AND LEGAL DESCRIPTION OF DISTRICT



BOYD All Precincts.

KNOX Thence down the main channel of the River to its intersection with a line dividing R-5 and 6W of the 6th P.M. in Knox County; thence southerly to the SE corner of T-29N, R-6W of the 6th P.M.; thence westerly along the Knox-Antelope County Line to the SW corner of Knox County at the SW corner of T-29N, R-8W of the 6th P.M.

HOLT Thence westerly to the SW corner of T-29N, R-9W of the 6th P.M.; thence northerly to the SW corner of S-18, T-29N, R-9W of the 6th P.M.; thence westerly to the SW corner of S-15, T-29N, R-13W of the 6th P.M.; thence northerly to the SE corner of S-33, T-30N, R-13W of the 6th P.M.; thence westerly to the SW corner of S-34, T-30N, R-14W of the 6th P.M.; thence northerly to the SE corner of S-16, T-30N, R-14W of the 6th P.M.; thence westerly to the SW corner of S-18, T-30N, R-14W of the 6th P.M.; thence northerly to the SE corner of T-31, R-15W of the 6th P.M.; westerly to the SW corner of T -31, R-15W of the 6th P. M.; thence northerly to the SE corner of S-13, T-31N, R-16W of the 6th P.M.; thence westerly to the Holt-Rock County line at the SW corner of S-18, T-31 **N,** R-16W of the 6th P.M.

ROCK Thence westerly to the SW corner of S-18, T-31N, R-19W of the 6th P.M.; thence southerly to the SE corner of T -31 N, R-20W of the 6th P. M.: thence westerly to the Rock-Brown County line at the SW corner of S-33, T-31 **N,** R-20W of the 6th P.M.; thence northerly on the Rock-Brown County line to it's intersection with the middle channel of the Niobrara River; thence up the main channel of the Niobrara River to its intersection with a line dividing Ranges 21W and 22W thence northerly on said dividing line to the point of beginning.

KEYA PAHA Commencing at a point at the NW corner of T-35N, R-21W of the 6th P.M. in Keya Paha County; thence easterly along the northern boundary of the State of Nebraska to its intersection with the middle channel of the Missouri River.

APPENDIX 2: – IMP GOALS, OBJECTIVES AND ACTION ITEMS.

Goal 1

1. To develop and implement processes for the adequate collection of hydrologic and other related data to assess water resources within the District.

Goal 1 Objectives

1.1. To conduct data collection and analyses of water supplies and demands, utilizing the best available information, data, and science.
1.2. To conduct studies to identify hydrologically distinct sub-areas within the District for the purposes of integrated management.
1.3. To monitor changes in water uses within the District.

Goal 2

2. To develop systematic approaches for the development and sustainability of water resources within the District.

Goal 2 Objectives

2.1. To assess the potential impact of new surface water and groundwater uses on existing surface water and groundwater users within the District
2.2. To determine allowable levels of water development for the District, and by subbasin when designated.

Goal 3

3. To prevent, resolve, and minimize water related conflicts among and between surface water and groundwater users.

Goal 3 Objectives

3.1. To establish procedures for securing water for sustained future growth of domestic, municipal, agricultural, commercial, and industrial water users within the District.
3.2. To establish rules and regulations regarding transfers, variances, water banking, water leasing, or other actions of water management within the District, if necessary, to enhance equitable water use management, mitigate new uses, or to avoid conflicts.

Goal 4

4. To develop and provide educational opportunities and outreach materials about hydrologically connected surface water and groundwater, water conservation, and to keep the constituents of the District informed about the IMP as it is implemented.

Goal 4 Objectives

4.1. To develop and disseminate water conservation guidelines for individuals to achieve sustainable water use.
4.2. To identify cost-share opportunities that may include collaborating with other agencies and other NRDs to implement plan objectives.
4.3. To encourage participation in information sharing with other organizations and agencies to conserve resources and prevent duplication of work.

Regulatory & Non-Regulatory Action Items

This voluntary IMP includes both regulatory and non-regulatory action items. The regulatory actions are mandatory. The non-regulatory actions are encouraged to be implemented voluntarily by water users. The groundwater controls authorized for adoption by the District are set forth in *Neb. Rev. Stat.* §§ 46-715 and 46-739; the surface water controls authorized for adoption by the Department are in *Neb. Rev. Stat.* §46-716 of the Ground Water Management and Protection Act.

A. Non-regulatory Action Items to Achieve Goals & Objectives
   1. The District and the Department will utilize available groundwater models and hydrologic tools to achieve the following:
      (a) To assist in identifying critical hydrologic areas in the District;
      (b) Collaborate with municipalities, water suppliers, and other entities to identify current water uses and future water demands;
      (c) Determine subbasins or sub-regions for the purposes of water management through the development of hydrogeological maps of the District;
      (d) Assess potential impacts to existing users consistent with Nebraska Administrative Code Title 457, Chapter 24;
      (e) Assess potential impacts to users by subbasins or sub-regions, once additional data and tools become available;
      (f) Identify regions where additional data may be needed;
      (g) Locate and confirm irrigated acres through the use of infrared photography of the District;
      (h) Measure additional surface water flows during periods of water shortages through the implementation of streamgages.
   2. Water Use Reporting and Data Exchange
      (a) Irrigation water use reporting. The District will implement a voluntary program on all high capacity wells to annually report the total quantity pumped, rate of pumping, and acres irrigated, in accordance with a system and format developed by the District. In addition, the Department will implement a voluntary reporting program for surface water irrigation permit holders in the District to identify the quantity of water pumped, the acres irrigated, and the type of irrigation system (e.g., gravity, pivot, etc.) used.
      (b) Municipal, commercial, and industrial water usage reporting. The District will implement a voluntary program for all municipal, industrial, and commercial establishments with high capacity wells to report annually their water use characteristics and well pumping data to the District, in accordance with a system and format implemented by the District. Once a database of water usage is collected and the water usage characteristics are known, the reporting requirements may change.
      (c) Data exchange. The District and the Department will develop a system to exchange water related information and share with other agencies if warranted.
   3. Information and Education Programs
      (a) The District and the Department will provide educational materials, such as pamphlets or website pages, or carry out educational activities, such as public meetings. This information may include topics such as hydrologically connected waters, integrated management plans, the planning process, or best management practices.
      (b) Contingent on budget and staff resources, the District and the Department will jointly pursue opportunities for public outreach efforts, such as news releases, in order to support water education or programs.

(c) The District and the Department will jointly identify and study opportunities for the development of transfers, variances, water banking, water leasing, and other actions of water management to potentially be used in the District.

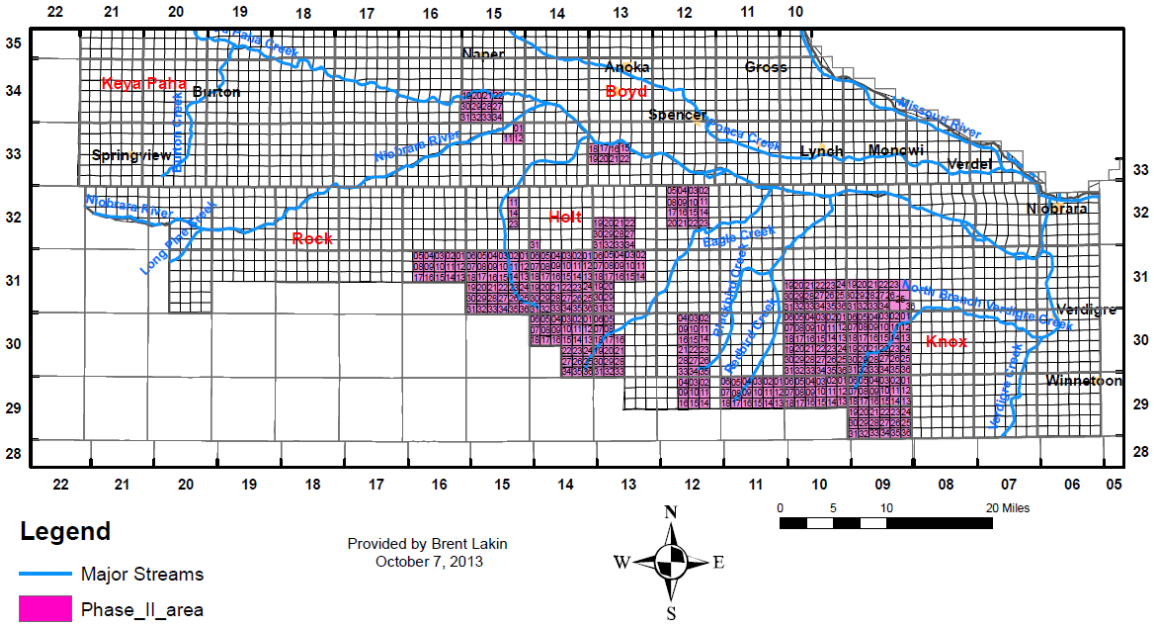
B. Groundwater Action Items (Controls) to Achieve Goals & Objectives

The District's Rules and Regulations will contain procedural details for the controls listed in this IMP. Persons desiring to apply for a new groundwater use or to alter an existing use should contact the District.

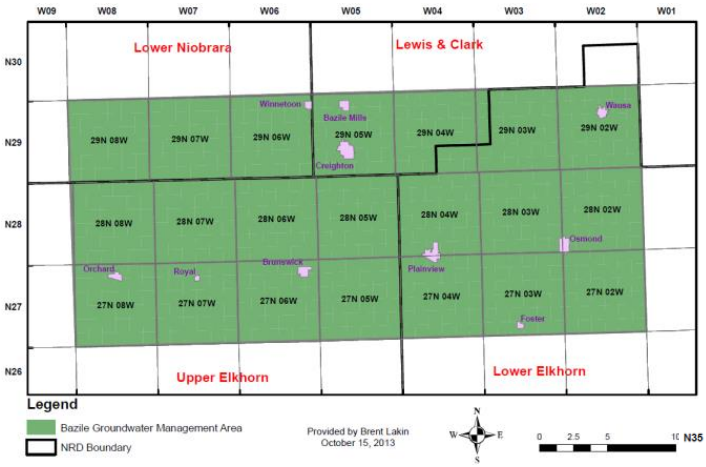
1. Certification of groundwater irrigated acres. The District will certify all irrigated acres within the District boundaries within two years (time will begin when the IMP is approved and goes into effect). The District is in the process of certifying all groundwater irrigated acres utilizing a GIS-based data system in conjunction with County Assessors and aerial photographs of historically irrigated acres.
2. Ranking system for the addition of wells. The District will develop controls for well permit ranking for the addition of new and/or helper irrigation wells on new and/or existing irrigated acres. In order for a well permit to be approved, the District will set a minimum score that all wells must meet before a permit will be approved. The purpose of the ranking system is to be able to continue to allow high capacity well development without creating negative impacts, conflicts, or interferences with neighboring water users. A maximum number of wells per system will be established using the following criteria: (1) thickness of primary aquifer formation; (2) calculated transmissivity; (3) irrigation well density; (4) public water supply well density; (5) domestic, livestock, and other well densities; (6) irrigation best management practice and stream depletion factors; and (7) certification by a hydrologist and/or a professional engineer the existing well has failed and a new well is necessary to continue pumping an adequate volume of irrigation water to the existing irrigated acres.
3. Flow metering. The District will require the mandatory installation of water flow meters on all new high capacity wells and/or modified irrigation wells and/or irrigation systems, commercial, industrial, or municipal water supply systems. This includes installation of a water flow meter prior to the addition of a helper well/s. The District will encourage the voluntary installation of water flow meters on all existing high capacity well systems.
4. Restriction on addition of irrigated acres. The District will establish a set number of new irrigated acres which can be applied for on an annual basis. The new acres will meet a minimum score set by the Board. The following criteria will be used: (1) irrigation type; (2) land capability class rating using USDA Natural Resources Conservation Service Web Soil Survey; (3) stream depletion factors; (4) groundwater quantity; (5) groundwater quality (nitrates) and compliance with the Nitrogen Certification Guidelines in the District's Ground Water Management Plan; and (6) irrigation concentration (well spacing requirements). These restrictions will be made mandatory throughout the entire District.

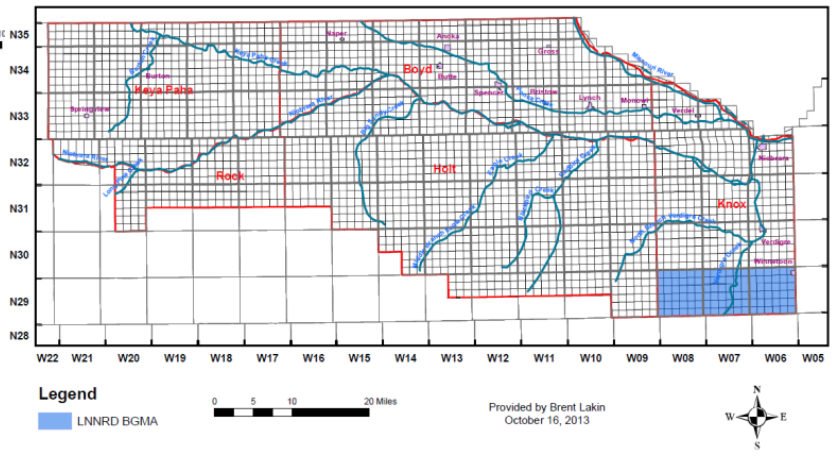
APPENDIX 3: – <u>MAPS OF GROUNDWATER QUALITY AREAS</u>

Lower Niobrara Natural Resources District Phase I (entire District) and Phase II Groundwater Management Area



<u>Bazile Groundwater Quality Management Area</u>





APPENDIX 4: – BAZILE GROUNDWATER MANAGEMENT PLAN ACTIONS AND TASKS

The advisory council identified several Action Items that will facilitate meeting the project goals. The Action Items listed below will be periodically reviewed and revised as the implementation of the plan progresses. It should be noted all of the activities are specific to the BGMA

1. User Education - to be completed within five years of plan approval.
    a. Prepare bi-annual mailings explaining the groundwater concerns, best management practices (BMPs), cost share programs, etc.
    b. Issue periodic news releases.
    c. Hold a minimum of three meetings to further educate producers.
    d. Initiate one-to-one contact with producers to facilitate the implementation or further implementation of BMPs.
    e. Educate communities in the area on the benefits of wellhead protection management planning.
2. Soil Sampling.
    a. Require annual soil sampling for any crop (including turf grass) where >50 lbs per acre per year of organic or inorganic nitrogen will be applied.
        i. Each sample will only be representative of 40 acres.
        ii. Sampling depths will be 0-8" and 8-24".
        iii. Producers are encouraged to sample 24"- 48".
    b. Each soil sample must include a cation exchange capacity and organic matter analysis.
    c. It is recommended NRDs provide cost share.
3. Irrigation Water Sampling.
    a. Irrigation water will be sampled every other year.
        i. Irrigation water users are encouraged to sample water annually.
    b. It is recommended NRDs provide cost share.
4. Water Well Flow Meters.
    a. Each operator is required to have at least one irrigation well flow meter.
    b. Larger operations will be required to have at least one meter per 10 existing wells.
    c. All new and replacement wells will be required to install a flow meter.
    d. Meters should be installed within five years of plan approval.
    e. NRDs should develop a meter inspection program.
5. Soil Moisture Sensors and Irrigation Scheduling.
    a. Each operator is required to install and utilize at least one soil moisture sensor for irrigation scheduling.
    b. Larger operations will be required to have at least one soil moisture sensor per 10 wells.
    c. Implementation should be completed within five years of plan approval.
6. Fall Fertilizer Application.
    a. No nitrogen fertilizer (organic or inorganic) shall be applied post-harvest to November 1.
    b. Surface applied organic nutrients will be exempted from this if the application is in compliance with future cropping needs and a nutrient management plan.
7. Winter Application.
    a. Nitrogen fertilizer applications to frozen or snow covered ground will not be allowed without district permission.
8. Manure Applications.
    a. All manure applied will be based on a nutrient analysis.
    b. Require applicator to uniformly apply organic nutrients.
    c. Application equipment should be maintained and calibrated.
9. Crop Tissue Analysis.
    a. Each producer will be required to complete one growing season tissue analysis and one late

season stalk nitrate test within five years of the plan approval.

10. Split Fertilizer Applications.
    a. Split application of nitrogen fertilizer will be required where the soil cat ion exchange capacity is <10.
    b. In soil types where the cation exchange capacity is> 10, one-to-one contact with producers should be undertaken to increase split applications on 50% of the BGMA.
11. Fertilizer application through irrigation system (fertigation).
    a. Work with producers to achieve 90% of corn producers utilizing fertigation.
    b. NRD are encouraged to provide cost share.
12. Nitrification Inhibitors.
    a. Encourage the use of nitrification inhibitors through education.
13. Variable application and precision farming.
    a. Create a partnership with local fertilizer distributors and crop consultants to create demonstration field(s).
    b. Demonstrations will include nitrification inhibitors; growing season tissue analysis and late season stalk nitrate test.
    c. Demonstration fields should incorporate multiple BMPs including no-till, cover crops, etc.
14. Nitrogen Budgeting/Accounting.
    a. Require producers to document nitrogen requirements and usage for all fields where >501bs per acre of nitrogen is applied.
    b. NRDs are encouraged to utilize a common reporting form or other form that contains the required information.
15. Sub-surface Irrigation.
    a. Work with a sub-surface irrigation system distributor to establish one demonstration field that includes the usage of a fertigation system.
16. Irrigation Well Rehabilitation.
    a. Implement water well construction standards that protect confined layers.
    b. Work with the Nebraska Water Well Standards Board to conduct a well rehabilitation demonstration.
17. Vadose Zone Sampling.
    a. The NRDs should establish baseline vadose zone nitrate conditions and conduct periodic re-assessments including the 10 and 20 year time frame.
18. Areas of Significant Concerns.
    a. The NRDs will monitor the progress of the actions and tasks undertaken and where necessary increased management will be undertaken.

Roles and Responsibilities

Several agencies, in addition to the watershed advisory council, will be responsible for various aspects of this project. A list of the participating agencies and their role in the project is as follows:

Nebraska Department of Environmental Quality WEQ): The NDEQ can provide funding to address nonpoint source problems. Funding comes from the EPA through Section 319 of the Federal Clean Water Act. In addition to providing technical assistance and grant administration, the NDEQ can also assist with water quality planning and monitoring.

Natural Resources District (NRDs): By statute the NRDs are responsible for managing groundwater within the state through the implementation of groundwater management plans. The NRDs can also contribute funding for the implementation ofBMPs, monitoring, and project administration.

USDA Natural Resources Conservation Service CNRCS): The NRCS can contribute funding through the EQIP program. Funds can be used for engineering, practice installation, practice incentives and technical support. The NRCS can also provide technical expertise and support during the implementation of the groundwater management plan.

APPENDIX 5: – LIST OF BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) provide logical and practical methods of improving groundwater quality. Best Management Practices are schedules of activities, maintenance procedures, and other management practices utilized to prevent or reduce present and future groundwater contamination. Best Management Practices include but are not limited to the following:

- Irrigation scheduling
- Proper rate of fertilizer application
- Pesticide management programs
- Rain interrupters on irrigation systems
- Crop Nutrient Management
- Monitors on application equipment
- UNL fertilizer recommended rate
- Use of nitrification inhibitors
- Proper timing of fertilizer application
- Chlorophyll meter
- Crop growth Infrared sensors
- Test plot - approximately 3-4 acres demonstrating:
    - reduced nitrogen rates
    - different nitrogen application timing than routinely practiced
    - use of inhibitors
    - use of nitrate concentration in irrigation groundwater
    - any other Nitrogen Best Management Practices
- Proper timing/rate of pesticide application
- Integrated Pest Management
- Irrigation scheduling
- Tensiometers
- Electrical resistance blocks
- Other conservation practices approved by the District

APPENDIX 6: – WELL PERMIT RANKING SYSTEM METHODOLOGY

Goal: To continue to allow high capacity well development without creating impacts, conflicts or interference with neighboring water well users.

The following criteria will be used in the District's Well Permitting Ranking System.

Main Criteria

1. Thickness of Primary Aquifer Formation
2. Transmissivity
3. Irrigation Well Density
4. Public Water Supply Well Density
5. Domestic, Livestock & "Other" Well Density
6. Irrigation Best Management Practices
    a. Irrigation Method
    b. Approved Soil Moisture Monitoring Equipment
    c. Other

Methodology

1. Thickness of Primary Aquifer Formation
    a. 1 point for each foot of primary aquifer thickness beginning with 0 points at 10 feet of thickness.
    b. Example – 18 feet of aquifer thickness equals 8 points (18ft – 10 ft).
    c. Maximum point value of 100.

2. Transmissivity
    a. The testhole log submitted will be reviewed and scored by comparing the testhole geologic particle size description, poor degree of sorting entry, and the estimated equivalent hydraulic conductivity from the work at the University of Nebraska Conservation and Survey by E.C. Reed and R. Piskin and/or by S.O. Lackey. (see Table 1 and Table 2).
    b. The hydraulic conductivity value for each geologic entry is then multiplied by the number of feet of thickness of the material as shown in the following equation: (1)
        i. $T = K * b$

        where T = transmissivity, gpd/ft
        K = hydraulic conductivity, ft/day
        b = saturated thickness, ft
    c. The corresponding "T" values for each layer of material are then added together and multiplied by 7.48 gal/ft^3 to express total transmissivity (T_t) in gpd/ft, as shown in the following equation: (2)
        i. $T_t = \sum (K * b) * 7.48$ gal/ft^3
    d. 1 point is scored for each 1,000 gpd/ft of transmissivity rounded to the nearest integer.
    e. Maximum point value of 100.

Table 1

Estimated Hydraulic Conductivity from Particle Size Descriptions

	Degree of Sorting			Silt Content		
Grain Size	**Poor**	**Moderate**	**High**	**Slight**	**Moderate**	**Very**
Clay and silt:						
Clay	0.0			2		
Silt, slightly clayey	1.3			18		
Silt, moderately clayey	2.7			11		
Silt, very clayey				7		
Silt; loess; sandy silt				20		
Sand and gravel						
Very fine sand	13	20	27	23	19	13
Very fine to fine sand	27	27		24	20	13
Very fine to medium sand	36	41-47		32	27	21
Very fine to coarse sand	48			40	31	24
Very fine to very coarse sand	59			51	40	29
Very fine sand to fine gravel	76			67	52	38
Very fine sand to medium gravel	99			80	66	49
Very fine sand to coarse gravel	128			107	86	64
Fine sand	27	40	53	33	27	20
Fine to medium sand	53	67		48	39	30
Fine to coarse sand	58	67-72		53	43	32
Fine to very coarse sand	70			60	47	35
Fine sand to fine gravel	88			74	59	44
Fine sand to medium gravel	114			94	75	57
Fine sand to coarse gravel	145			107	87	72
Medium sand	67	80	94	64	51	40
Medium to coarse sand	74	94		72	57	42

Medium to very coarse sand	84	98-111		71	61	49
Medium sand to fine gravel	103			84	68	52
Medium sand to medium gravel	131			114	82	66
Medium sand to coarse gravel	164			134	108	82
Coarse sand	80	107	134	94	74	53
Coarse to very coarse sand	94	134		94	75	57
Coarse sand to fine gravel	116	136-156		107	88	68
Coarse sand to medium gravel	147			114	94	74
Coarse sand to coarse gravel	184			134	100	92
Very coarse sand	107	147	187	114	94	74
Very coarse sand to fine gravel	134	214		120	104	84
Very coarse sand to medium gravel	170	199-227		147	123	99
Very coarse sand to coarse gravel	207			160	132	104
Gravel						
Fine gravel	160	214	267	227	140	107
Fine to medium gravel	201	334		201	167	134
Fine to coarse gravel	245	289-334		234	189	144
Medium gravel:	241	321	401	241	201	160
Medium to coarse gravel	294	468		294	243	191
Coarse gravel	334	468	602	334	284	234

The table above shows the estimated hydraulic conductivity values in units of (ft per day) from an unpublished and undated paper by E.C. Reed and R. Piskin as it was published in “Hydrogeology of Parts of the Twin Platte and Middle Republican Natural Resources Districts, Southwestern Nebraska” by J. W. Goeke, J. M. Peckenpaugh, R. E. Cady, and J. T. Dugan, Nebraska Water Survey Paper No. 70, April 1992, published through the Conservation and Survey Division, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

Table 2

Estimated Hydraulic Conductivity

Ogallala Generalized Description-LN NRD

11/6/2014 **CSD/Sol**

Sand	vf-m	sl-v sty	sotring=mod to well			
		ave=mod	Hi side of mod			Generally gradational changes in grain size,
K (R&P)	36	27	45		**Average K=36**	i.e. silt grading to sand then back to silt

Sandstone	vf-m	sl-v sty	sotring=mod to well	cementation=sl-mod		Generally more slight than moderate
		ave=mod	Hi side of mod	mod=50% & sl=25%		cemented: (27+27+18)/3 =24 (note: quick
K (R&P)		Ave 36		18 -27	**Average K=24**	scan of e-logs SS is ~20-30 ohm-m less than
						sand. 24 is 33% less than 36

Pepper Sand	f-m	none to sl	well to mod		
			low side of well		(Note 36*1.25=45)
K (R&P)	53	48	67	**Average K=56**	

Silt	K (R&P)	**Average K=10**	Note: on the high side because Ogallala silt is often m-v sandy. Note: Sandy clay is often the term drillers use for silt.

Clay	K (R&P)	**K=1**	Note: On the low side since often drillers use this term for not sand but could be silt.

Factors

Multiple * .75 if below		**Multiple by .6 if below**		**Multiple * 1.5 if below**		**Add 3 if below**	
First Description	**Second Description**	**First Description**	**Second Description**	**First Description**	**Second Description**	**First**	**Second**
Sand (36)	with clay silty or with silt and sandstone partly cemented	Sand (36)	and clay and silt very silty	Silt (8)	and sand with sand and sandstone	Clay (1)	sandy and sand with sand and SS
Sandstone (24)	with clay clay streaks silty or with silt	Sandstone (24)	and clay and silt very silty	**Other:**			

The Table 2 above for estimated hydraulic conductivity (K in ft/day) was developed by S.O. Lackey, Hydrogeologist, for the University of Nebraska Conservation and Survey Division. The K values are based on review of many testhole particle size descriptions and their estimated hydraulic conductivities for primary formations in the Ogallala aquifer found in the Lower Niobrara NRD.

Estimated hydraulic conductivity values in both Table 1 and Table 2 can be used as given or averaged to best fit the well drillers' testhole descriptions of particle size for the lithology of each layer of the primary aquifer.

3. Irrigation Well Density

a. The irrigation well density is the distance away from the proposed irrigation well in relation to all other irrigation wells located within a 6,000 foot radius. The point value is calculated using the following empirical equation: (3)

i. Points = $100 - [\sum (d * (d * .00012)) / t] - [(n / t) / .01]$

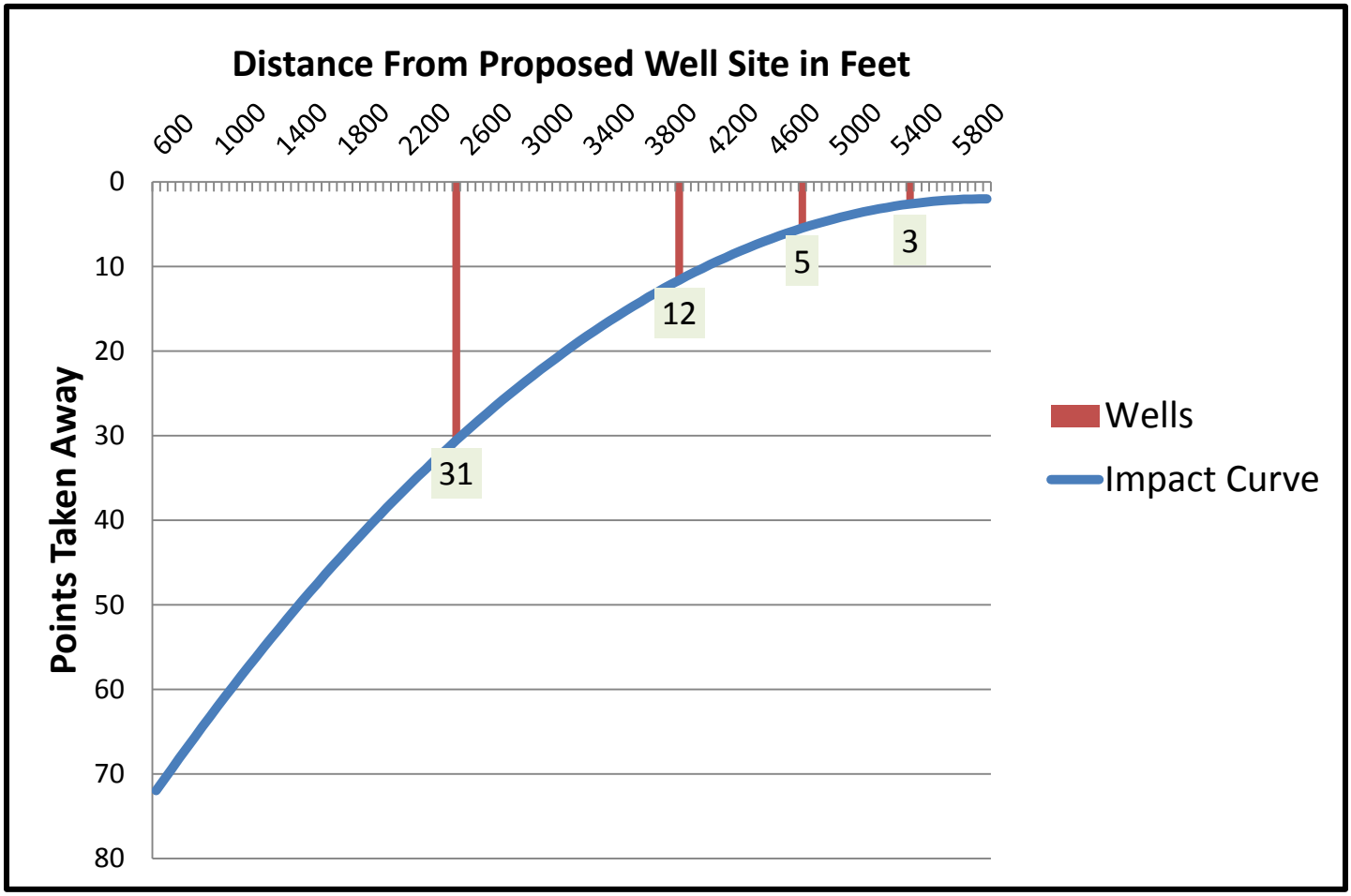
where n = number of irrigation wells within 6,000 feet of the proposed well.

d = 6,000 – (distance from proposed well).

$t = T_t / 1000$

ii. Maximum point value of 100.

iii. Graphical representation of Equation (3) with 4 irrigation wells at distances of 2,550, 3,850, 4,800, and 5500 feet and a t value equal to 50. **Resulting Score: 48 Points.**



4. Public Water Supply Well Density

a. The public water supply well density is the distance away from the proposed irrigation well in relation to public supply wells located within a 6,000 foot radius. The point value for public water supply wells located within a 6,000 foot radius is calculated using the following empirical equation: (4)

i. $\text{Points} = 50 - [\ \sum (d * (d * .00012)) / t\ ] - [\ (n / t) / .01\ ]$

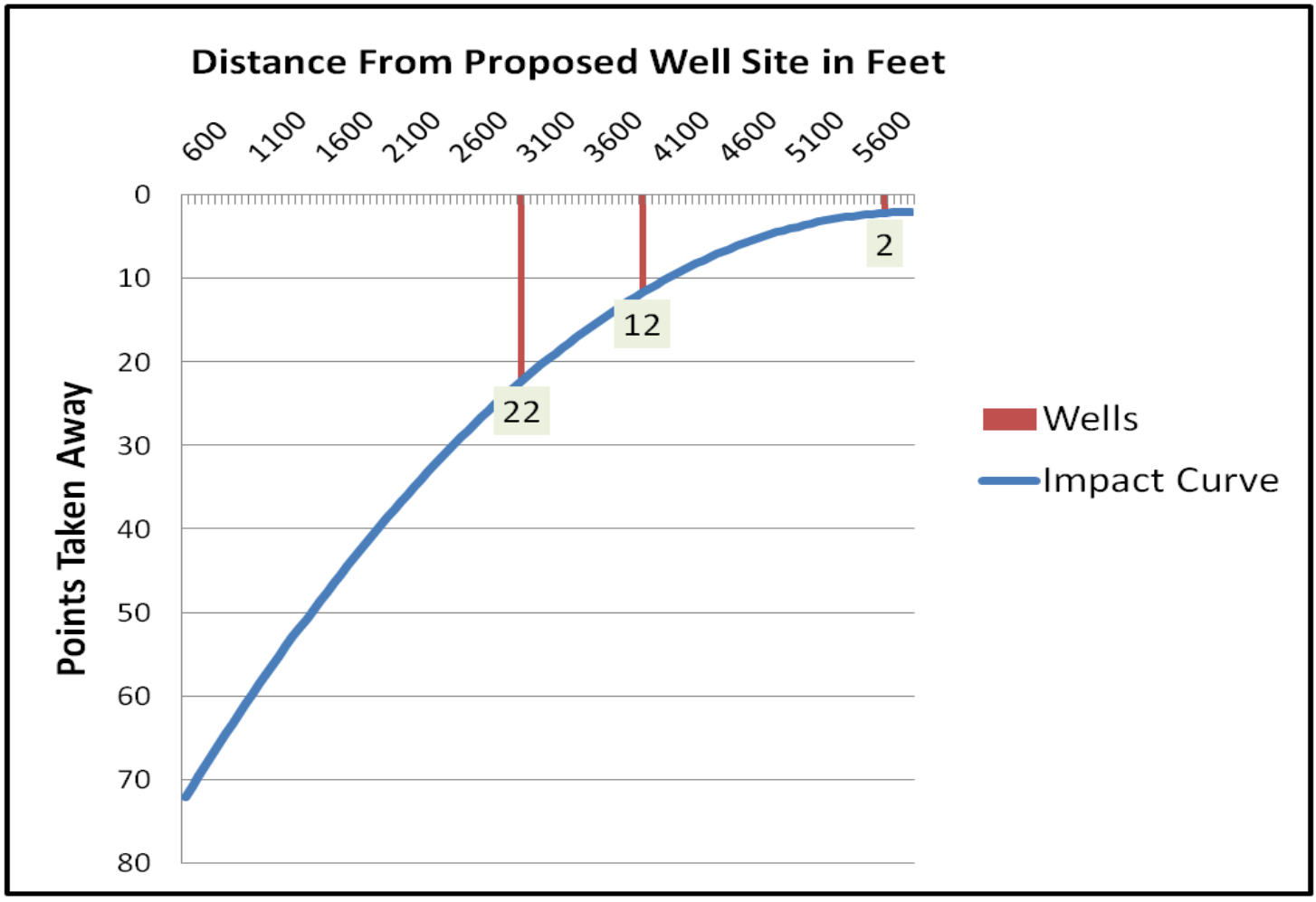
where n = number of public water supply wells within 6,000 feet

d = 6,000 - distance from proposed well

$t = T_t / 1000$

ii. Maximum positive point value of 50. This maximum point value provides extra protection of higher valued Public Water Supply Wells and the legal requirement that this public water system must continue to meet the demands of customers connected to the system.

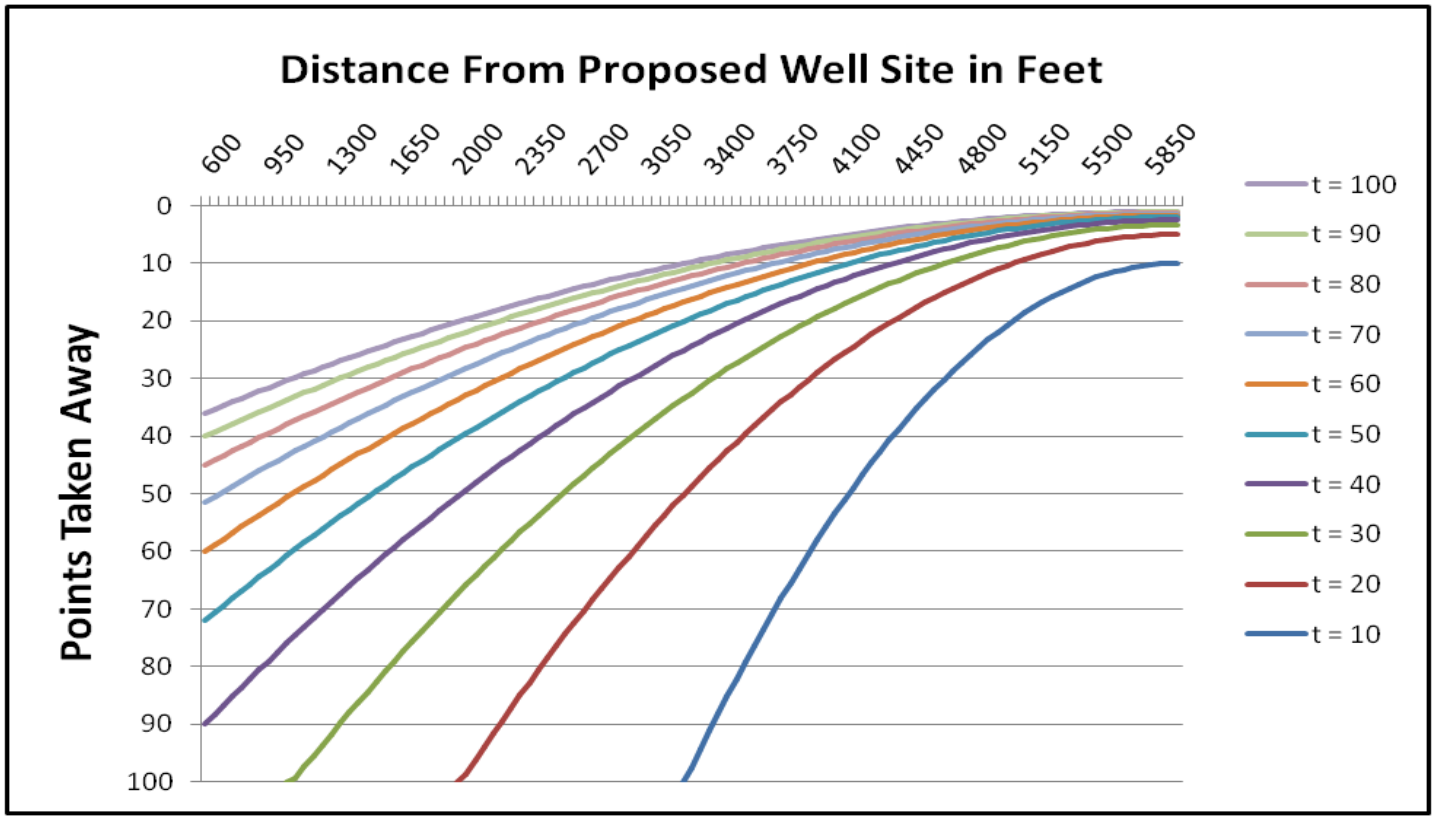
iii. Graphical representation of Equation (4) with 3 public water supply wells at distances of 3,100, 4,000, and 5800 feet and a t value of 50. **Resulting Score: 14 points.**



5. **Domestic, Livestock & "Other" Well Density**
    a. The domestic, livestock & "other" well densities are also calculated using equation (3) as for Public Water Supply Well density. Domestic and Livestock Wells are also recognized as needing higher protection from irrigation wells. The "other" wells such as commercial, industrial, and still others will have to be considered on their own merits and would likely be determined by the District's Variance Committee and Board of Directors.
6. **Irrigation Best Management Practices**
    a. Additional ranking system points available based upon irrigation management practices agreed to be installed and operated:
        i. Irrigation Method
            - Gravity 0
            - Pivot/Sprinkler 25
            - Subsurface Drip 50
        ii. Irrigation Management Practice
            - Approved Soil Moisture Monitoring Equipment 25

Well Density and Transmissivity

a. The well density calculations are completed using the calculated total transmissivity (T_t) of the primary aquifer from the testhole log.
b. Graphical representation of the impact curve **and points taken away** are based on calculated total transmissivity where $t = T_t / 1000$.

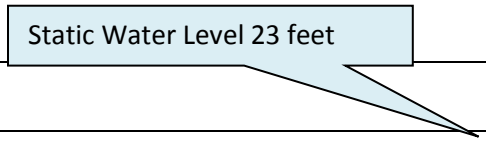


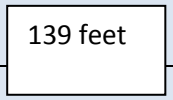
Example Calculation of Well Permit Ranking System:

Example Data

Testhole Log

Material	From, ft.	To, ft.	b	K in ft per day	T in ft per day
Top soil	0	2			
Meduim gravel	2	18			
Fine gravel	18	23			
Fine gravel	23	30	7	160	1120
Brown clay	30	33	3	1	3
Fine to medium gravel	33	36	3	201	603
Fine gravel	36	54	18	160	2880
Fine sand to fine gravel	54	75	21	88	1848
Brown clay	75	90	15	1	15
Clay with fine sand layers	90	108	18	4	72
Clay with fine sand layers	108	144	36	4	144
Brown clay	144	162	18	1	18
Yellow clay / Shale	162	180			
		Total	139		6,703





$T = K * b$ = ft /day * ft = ft^2/day * 7.48 gal/ft^3 = gpd/ft , hence

6,703 ft per day * 7.48 gal per cubic ft = 50,138 gpd/ft which = T_t Total Transmissibilty of primary aquifer.

Ranking System Worksheet

Criteria	Maximum Points	Value	Units	Point Value
1. Thickness of Primary Aquifer Formation	100	139	feet	**100**
2. Transmissivity	100	50,138	gallons per day per foot	**50**
3. Irrigation Well Density	100	48		**48**
		4	# of wells	
4. Public Water Supply Well Density	50	14		**14**
		3	# of wells	
5. Domestic & Livestock Well Density	50	50		**50**
		0	# of wells	
6. Irrigation Best Management Practices				**25**
Gravity	0			
Pivot/Sprinkler	25			
Subsurface Drip	50			
Soil Moisture Monitoring	25			
Total Points Possible	475			**287**

Definitions and Discussion/Summary of Well Permit Ranking Methodology

Primary Aquifer Thickness (b). A geologic formation, group of formations, or part of a formation containing sufficient saturated permeable material to yield economical quantities of groundwater to wells.

Hydraulic Conductivity (K), ft/day. The rate of groundwater flow through a porous medium measured in gallons per day through a cross-section of one square foot under a unit hydraulic gradient at prevailing temperature. The estimated hydraulic conductivity values for calculating the transmissivity were estimated based on work at the University of Nebraska Conservation by E.C. Reed and R. Piskin. They assigned permeability values to various unconsolidated materials based on grain size, particle size, degree of sorting, and silt content. This work has been used by several authors as the basis for estimating hydraulic conductivity of the sedimentary deposits of Nebraska. Due to the well driller's personal interpretation of particle size descriptions only the "Poor" Degree of Sorting column of values will be used to estimate the hydraulic conductivity, K, values.

Transmissivity (T), ft^2/day. The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient expressed in ft^2 per day . It is a function of properties of the water, the porous media, and thickness of the porous media. Transmissivity differs from place to place and can vary with time. Differences in transmissivity are related to lateral changes in textural composition of the sediments comprising the aquifer. As the water table rises or declines, the saturated thickness also changes, thereby changing the transmissivity. Therefore we will define the term Total Transmissivity.

Total Transmissivity (T_t), gpd/ft. The transmissivity of the primary aquifer approximated by summing the products of hydraulic conductivity and thickness for each different lithology layer that occurs in the vertical section of the aquifer. The effect of differing transmissivity upon the shape, depth, and radial extent of the cone of depression for any well, when pumped, differs in size and shape depending upon the pumping rate, length of pumping period, aquifer characteristics, slope of the water table, and groundwater recharge within the zone of influence of the well. A low aquifer transmissivity (less than 10,000 gpd/ft) the cone of depression would be deep with a small base and steep sides. For an aquifer with a high transmissivity (greater than 100,000 gpd/ft) the cone of depression would be shallow with an extensive radius.

Empirical equation. An equation arrived at by relying on or derived from observations, experiments, and/or practical experience, not theory.

Interference between adjacent wells. The total interference effect in any one well tapping the same aquifer in a well field is the sum of the influences produced by all others of the group.

In summary:

The methodology set forth herein for ranking new, supplemental, and replacement well permits used to determine the hydraulic conductivity and transmissivity is as previously stated: each layer(s) of principle aquifer material recorded in the testhole lithologic log is classified and assigned a value for hydraulic conductivity based upon the tables by Reed, Piskin, and Lackey . The hydraulic conductivity is then multiplied by the thickness, in feet, of that material to get a transmissivity value for the layer(s). The sum of the transmissivities of the principle aquifer layer(s) is the "total transmissivity" of the aquifer(s) at the testhole location. Once the transmissivity has been determined an impact on the surrounding wells within 6,000 feet of the testhole location will be established using the Lower Niobrara NRD well density impact empirical equation. This equation uses the factors of distance and transmissivity to establish an impact derived from each individual well and a compounded impact from the interaction of all the wells within the 6,000 feet, for which the sum of results is the total well density score.

APPENDIX 7: – SOIL TYPES WITHIN THE DISTRICT

The following are soil type identifications which are found in the District. This identification will be used to determine which category a soil of a given field will be identified as for use in calculating the Gross System Capacity. The following are the seven (7) soil types used in the Gross System Capacity: Silt Loam, Sandy Clay Loam, Silty Clay Loam, Silty Clay, Sandy Loam, Loamy Sand, Fine Sand. The percent of each soil type in a given field will be used to calculate the average Gross System Capacity for a field.

oldmusym	oldmuname
Go	Grigston silt loam, 0 to 2 percent slopes
IhB	Inavale loamy fine sand, 0 to 3 percent slopes
IgB	Inavale fine sand, channeled, 0 to 3 percent slopes
IfD	Inavale fine sand, 3 to 11 percent slopes
In	Inavale fine sandy loam, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Et	Eltree silt loam, 0 to 2 percent slopes
BrG	Bristow silty clay, 20 to 40 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
BoD	Boyd silty clay, 6 to 11 percent slopes
Bs	Brocksburg fine sandy loam, 0 to 2 percent slopes
Bt	Brocksburg loam, 0 to 2 percent slopes
Jn	Jansen loam, 0 to 2 percent slopes
JnC	Jansen loam, 2 to 6 percent slopes
JnD	Jansen loam, 6 to 11 percent slopes
LaD	Labu silty clay, 6 to 11 percent slopes
LcF	Labu-Sansarc silty clays, 11 to 30 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
LsC	Lynch silty clay, 2 to 6 percent slopes
LsD	Lynch silty clay, 6 to 11 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
LyD	Lynch-Bristow silty clays, 6 to 11 percent slopes
LyF	Lynch-Bristow silty clays, 11 to 30 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
MaG	Mariaville-Paka loams, 15 to 40 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
MeE	Meadin sandy loam, 3 to 17 percent slopes
Oe	O'Neill fine sandy loam, 0 to 2 percent slopes
OeC	O'Neill fine sandy loam, 2 to 6 percent slopes
OfD	O'Neill-Meadin fine sandy loams, 3 to 9 percent slopes
PaC	Paka fine sandy loam, 2 to 6 percent slopes
Ph	Paka loam, 0 to 2 percent slopes
PhC	Paka loam, 2 to 6 percent slopes
PhD	Paka loam, 6 to 11 percent slopes
PoC	Promise silty clay, 2 to 6 percent slopes
RaE	Ree silt loam, 11 to 15 percent slopes
RaC	Ree silt loam, 2 to 6 percent slopes
RaD	Ree silt loam, 6 to 11 percent slopes
ReC	Reliance silt loam, 2 to 6 percent slopes

ReD	Reliance silt loam, 6 to 11 percent slopes
RfC	Reliance silty clay loam, 2 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
SaG	Sansarc silty clay, 20 to 40 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ve	Verdel silty clay, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
WeC	Wewela fine sandy loam, 2 to 6 percent slopes
Cb	Cass fine sandy loam, 0 to 2 percent slopes
Sc	Scott silt loam, 0 to 1 percent slopes
Or	Ord fine sandy loam, 0 to 2 percent slopes
DuB	Dunday loamy fine sand, 0 to 3 percent slopes
DuC	Dunday loamy fine sand, 3 to 6 percent slopes
DuD	Dunday loamy fine sand, 6 to 11 percent slopes
DxB	Dunday loamy fine sand, loamy substratum, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VaE	Valentine fine sand, 6 to 17 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VbB	Valentine loamy sand, 0 to 3 percent slopes
On	Onita silt loam, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
GrB	Grigston silt loam, channeled, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ba	Barney silt loam, 0 to 2 percent slopes
Le	Leshara silt loam, 0 to 2 percent slopes
Be	Blendon fine sandy loam, 0 to 2 percent slopes
BeC	Blendon fine sandy loam, 2 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
CrE2	Crofton silt loam, 11 to 15 percent slopes, eroded
	This map unit was added to the soil survey from an adjacent county for joining purposes.
NoC	Nora silt loam, 2 to 6 percent slopes
NoD	Nora silt loam, 6 to 11 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ab	Albaton silty clay, 0 to 2 percent slopes
Bd	Blake silty clay loam, 0 to 2 percent slopes
He	Haynie silt loam, 0 to 2 percent slopes
Oa	Onawa silty clay, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ha	Hall silt loam, 0 to 2 percent slopes
Sm	Simeon loamy sand, 0 to 2 percent slopes
SvF2	Simeon-Valentine complex, 3 to 30 percent slopes, eroded
SuC	Simeon-Valentine loamy sands, 0 to 6 percent slopes
AnF	Anselmo fine sandy loam, 11 to 20 percent slopes
AnC	Anselmo fine sandy loam, 2 to 6 percent slopes

AnD	Anselmo fine sandy loam, 6 to 11 percent slopes
ArF	Anselmo-Rock outcrop complex, 11 to 20 percent slopes
Rw	Riverwash
AED	Arents, earthen dam
GP	Gravel pit
M-W	Miscellaneous water, sewage lagoons
zw	This map unit was added to the soil survey from an adjacent county for joining purposes.
W	Water
zwa	Water > 40 acres
Bn	Boel fine sandy loam, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ib	Inavale fine sand, 0 to 2 percent slopes
Id	Inavale loamy fine sand, 0 to 2 percent slopes
Ia	Inavale sand, channeled
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Nb	Nimbro silt loam, 0 to 2 percent slopes
BwG	Bristow silty clay, 20 to 40 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Jn	Jansen loam, 0 to 2 percent slopes
JnC	Jansen loam, 2 to 6 percent slopes
JsC	Jansen-Meadin loams, 3 to 6 percent slopes
Jt	Josburg fine sandy loam, 0 to 2 percent slopes
Jw	Josburg loam, 0 to 2 percent slopes
LaC	Labu silty clay, 2 to 6 percent slopes
LaD	Labu silty clay, 6 to 11 percent slopes
LcF	Labu-Sansarc silty clays, 11 to 30 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
LxC	Lynch silty clay, 2 to 6 percent slopes
LxD	Lynch silty clay, 6 to 11 percent slopes
MfB	Meadin loam, 0 to 3 percent slopes
MeB	Meadin sandy loam, 0 to 3 percent slopes
MeF	Meadin sandy loam, 3 to 30 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Oe	O'Neill fine sandy loam, 0 to 2 percent slopes
OeC	O'Neill fine sandy loam, 2 to 6 percent slopes
Of	O'Neill loam, 0 to 2 percent slopes
OdB	O'Neill loamy sand, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
OmF	O'Neill-Meadin fine sandy loams, 11 to 30 percent slopes
OmC	O'Neill-Meadin fine sandy loams, 2 to 6 percent slopes
OmD	O'Neill-Meadin fine sandy loams, 6 to 11 percent slopes
Pg	Paka fine sandy loam, 0 to 2 percent slopes
PgC	Paka fine sandy loam, 2 to 6 percent slopes
Ph	Paka loam, 0 to 2 percent slopes
PhC	Paka loam, 2 to 6 percent slopes
PhD2	Paka loam, 6 to 11 percent slopes, eroded
SaG	Sansarc silty clay, 20 to 40 percent slopes

Vx	Verdel silty clay loam, 0 to 2 percent slopes
Ws	Wewela fine sandy loam, 0 to 2 percent slopes
WsC	Wewela fine sandy loam, 2 to 6 percent slopes
Wt	Wewela loam, 0 to 2 percent slopes
Ld	Lamo-Lute loams, 0 to 2 percent slopes
Ce	Cass fine sandy loam, 0 to 2 percent slopes
Fm	Fillmore silt loam, 0 to 2 percent slopes
Ts	Almeria-Calamus complex, channeled
Bc	Blackloup loam, 0 to 1 percent slopes
Bd	Blackloup loam, wet, 0 to 1 percent slopes
Or	Ord loam, 0 to 2 percent slopes
Os	Ord-Lute fine sandy loams, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ep	Elsmere fine sandy loam, 0 to 2 percent slopes
LkB	Libory loamy fine sand, 0 to 3 percent slopes
LmB	Libory-Whitelake loamy fine sands, 0 to 3 percent slopes
Bg	Blown-out land-Valentine complex, 6 to 60 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
DuB	Dunday loamy sand, 0 to 3 percent slopes
DuC	Dunday loamy sand, 3 to 6 percent slopes
DxB	Dunn loamy sand, 0 to 3 percent slopes
Eb	Els loamy sand, 0 to 2 percent slopes
EfB	Els-Ipage complex, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Em	Elsmere loamy fine sand, 0 to 2 percent slopes
En	Elsmere loamy fine sand, clayey substratum, 0 to 2 percent slopes
EsB	Elsmere-Ipage loamy fine sands, 0 to 3 percent slopes
Eu	Elsmere-Selia loamy fine sands, 0 to 2 percent slopes
Gb	Gannett loam, 0 to 2 percent slopes
Gf	Gannett loam, wet, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
IgB	Ipage loamy sand, 0 to 3 percent slopes
IfB	Ipage sand, 0 to 3 percent slopes
ItB	Ipage-Tryon fine sands, 0 to 3 percent slopes
Lp	Loup fine sandy loam, 0 to 2 percent slopes
Lr	Loup fine sandy loam, wet, 0 to 2 percent slopes
Ma	Marlake fine sandy loam, 0 to 2 percent slopes
PtB	Pivot loamy sand, 0 to 3 percent slopes
PtC	Pivot loamy sand, 3 to 9 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
To	Tryon loamy fine sand, 0 to 2 percent slopes
Tp	Tryon loamy fine sand, wet, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VaB	Valentine fine sand, 0 to 3 percent slopes
VaD	Valentine fine sand, 3 to 9 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VaE	Valentine fine sand, rolling

VaG	Valentine fine sand, Rolling, and Hilly
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VeD	Valentine-Dunday loamy fine sands, 3 to 9 percent slopes
VmD	Valentine-Els complex, 0 to 9 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VeB	Valentine-Dunday loamy fine sands, 0 to 3 percent slopes
VsD	Valentine-Simeon sands, 3 to 9 percent slopes
VsF2	Valentine-Simeon sands, 9 to 30 percent slopes, eroded
VtE	Valentine-Tryon fine sands, 0 to 17 percent slopes
VwD	Valentine-Wewela complex, 3 to 9 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ba	Barney silt loam, channeled
Ls	Barney-Boel-Calamus complex, channeled
Lf	Lawet loam, drained, 0 to 2 percent slopes
Lg	Lawet-Lute complex, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Te	Trent silt loam, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Bb	Bazile silt loam, 0 to 2 percent slopes
BbC	Bazile silt loam, 2 to 6 percent slopes
BsB	Boelus loamy sand, 0 to 3 percent slopes
BsC	Boelus loamy sand, 3 to 6 percent slopes
BsD	Boelus loamy sand, 6 to 11 percent slopes
BtB	Boelus loamy sand, gravelly substratum, 0 to 3 percent slopes
BuD	Boelus-Meadin complex, 6 to 11 percent slopes
ByF	Brunswick-Tassel fine sandy loams, 11 to 40 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
BxF	Brunswick-Pivot complex, 9 to 30 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
No	Nora silt loam, 0 to 2 percent slopes
NoC	Nora silt loam, 2 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
LnC	Loretto loam, 2 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Bm	Boel loamy fine sand, 0 to 2 percent slopes
Bo	Boel silty clay loam, overwash, 0 to 2 percent slopes
Bp	Boel-Inavale complex, channeled
Lh	Lex-Lute loams, 0 to 2 percent slopes
Ax	Anselmo-O'Neill sandy loams, 0 to 2 percent slopes
SmB	Simeon loamy sand, 0 to 3 percent slopes
SkB	Simeon sand, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.

An	Anselmo fine sandy loam, 0 to 2 percent slopes
AnC	Anselmo fine sandy loam, 2 to 6 percent slopes
At	Anselmo loam, 0 to 2 percent slopes
AxC	Anselmo-O'Neill sandy loams, 2 to 6 percent slopes
Rw	Riverwash
Ft	Fluvaquents, sandy-Fluvaquents, loamy complex, 0 to 1 percent slopes
LD	Sanitary landfill
INT	Aquolls
AED	Arents, earthen dam
GP	Gravel pit
Pm	Pits, sand and gravel
M-W	Miscellaneous water, sewage lagoons
zw	This map unit was added to the soil survey from an adjacent county for joining purposes.
W	Water
zwa	Water > 40 acres
Bo	Boel fine sandy loam, 0 to 2 percent slopes
IhB	Inavale loamy fine sand, 0 to 3 percent slopes
IgB	Inavale fine sand, channeled, 0 to 3 percent slopes
IfD	Inavale fine sand, 3 to 11 percent slopes
Mu	Munjor fine sandy loam, 0 to 2 percent slopes
Bt	Brocksburg loam, 0 to 1 percent slopes
Tu	Tuthill fine sandy loam, 0 to 2 percent slopes
Ho	Holt fine sandy loam, 0 to 2 percent slopes
HoC	Holt fine sandy loam, 2 to 6 percent slopes
HtC	Holt-Tassel fine sandy loams, 3 to 6 percent slopes
HtD	Holt-Tassel fine sandy loams, 6 to 11 percent slopes
MfC	Manter fine sandy loam, 2 to 6 percent slopes
MaB	Manter loamy fine sand, 0 to 3 percent slopes
MaC	Manter loamy fine sand, 3 to 6 percent slopes
Ja	Jansen fine sandy loam, 0 to 2 percent slopes
Jn	Jansen loam, 0 to 2 percent slopes
JnC	Jansen loam, 2 to 6 percent slopes
JoB	Jansen-Meadin loams, 0 to 3 percent slopes
TaF	Tassel loamy fine sand, 3 to 30 percent slopes
TdE	Tassel-Duda complex, 3 to 15 percent slopes
TrG	Tassel-Ronson-Duda complex, 15 to 70 percent slopes
LaD	Labu silty clay, 6 to 11 percent slopes
LcF	Labu-Sansarc silty clays, 11 to 30 percent slopes
MkG	Mariaville-Keota silt loams, 15 to 60 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
MnF	Meadin gravelly sandy loam, 3 to 30 percent slopes
Oe	O'Neill fine sandy loam, 0 to 2 percent slopes
OeC	O'Neill fine sandy loam, 2 to 6 percent slopes
OeD	O'Neill fine sandy loam, 6 to 9 percent slopes
OaB	O'Neill loamy fine sand, 0 to 3 percent slopes
OhB	O'Neill-Meadin fine sandy loams, 0 to 3 percent slopes
OkD	O'Neill-Valentine complex, 1 to 9 percent slopes
Pf	Paka fine sandy loam, 0 to 2 percent slopes

	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ph	Paka loam, 0 to 1 percent slopes
PhB	Paka loam, 1 to 3 percent slopes
PmC	Paka-Mariaville loams, 3 to 6 percent slopes
PmF	Paka-Mariaville loams, 11 to 30 percent slopes
RaB	Ree loam, 1 to 3 percent slopes
Rb	Ree loam, clayey substratum, 0 to 2 percent slopes
ReC	Reliance silt loam, 2 to 6 percent slopes
RoD	Ronson-Anselmo fine sandy loams, 6 to 9 percent slopes
RoF	Ronson-Anselmo fine sandy loams, 9 to 30 percent slopes
RtB	Ronson-Tassel fine sandy loams, 0 to 3 percent slopes
SaG	Sansarc silty clay, 20 to 40 percent slopes
Ve	Verdel silty clay loam, 0 to 1 percent slopes
VeB	Verdel silty clay loam, 1 to 3 percent slopes
VeC	Verdel silty clay loam, 3 to 6 percent slopes
WeB	Wewela fine sandy loam, 0 to 3 percent slopes
WeC	Wewela fine sandy loam, 3 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Bc	Blackloup loam, 0 to 1 percent slopes
Bd	Blackloup loam, wet, 0 to 1 percent slopes
Op	Ord fine sandy loam, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Or	Ord-Loup fine sandy loams, 0 to 2 percent slopes
DdB	Duda loamy fine sand, 0 to 3 percent slopes
DdC	Duda loamy fine sand, 3 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
DuB	Dunday loamy fine sand, 0 to 3 percent slopes
DxB	Dunday-Duda loamy fine sands, 0 to 3 percent slopes
Eo	Els fine sand, 0 to 2 percent slopes
Es	Elsmere loamy fine sand, 0 to 2 percent slopes
IpB	Ipage loamy fine sand, 0 to 3 percent slopes
Lo	Loup fine sandy loam, 0 to 2 percent slopes
Lp	Loup fine sandy loam, wet, 0 to 2 percent slopes
Mm	Marlake loamy fine sand, 0 to 1 percent slopes
MpB	McKelvie loamy fine sand, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
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VaG	Valentine fine sand, hilly
VaF	Valentine fine sand, rolling
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VbD	Valentine loamy fine sand, gently rolling
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VcF	Valentine-Tassel complex, rolling
VdC	Valentine-Wewela loamy fine sands, 3 to 6 percent slopes
VdF	Valentine-Wewela loamy fine sands, 6 to 30 percent slopes

On	Onita silt loam, 0 to 1 percent slopes
ScF	Schamber gravelly sandy loam, 11 to 30 percent slopes
Vo	Vetal fine sandy loam, 0 to 2 percent slopes
Vt	Vetal loam, 0 to 1 percent slopes
VtB	Vetal loam, 1 to 3 percent slopes
VtC	Vetal loam, 3 to 6 percent slopes
Ba	Barney fine sandy loam, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Bb	Barney-Bolent complex, channeled
Ab	Albaton variant clay, 0 to 2 percent slopes
Cb	Cass loam, 0 to 2 percent slopes
CcB	Cass loam, channeled, 0 to 3 percent slopes
SmF	Simeon-Manter-Ronson complex, 6 to 17 percent slopes
SvF2	Simeon-Valentine fine sands, 6 to 17 percent slopes, eroded
SwB	Simeon-Valentine loamy sands, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
An	Anselmo fine sandy loam, 0 to 2 percent slopes
AnC	Anselmo fine sandy loam, 2 to 6 percent slopes
AmB	Anselmo loamy fine sand, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Fu	Fluvaquents
Ft	Fluvaquents, sandy-Fluvaquents, loamy complex, 0 to 1 percent slopes
AED	Arents, Earthen Dam
M-W	Miscellaneous Water, Sewage Lagoons
W	Water
zwb	Water < 40 acres
zwa	Water > 40 acres
Ig	Inavale fine sand, channeled, 0 to 2 percent slopes
Iv	Inavale fine sand, channeled, frequently flooded
Ig2	Inavale fine sand, poorly drained, channeled, 0 to 2 percent slopes, frequently flooded
Im	Inavale fine sandy loam, 0 to 2 percent slopes
Im2f	Inavale fine sandy loam, poorly drained, 0 to 2 percent slopes, frequently flooded
Im2	Inavale fine sandy loam, poorly drained, 0 to 2 percent slopes, rarely flooded
In	Inavale fine sandy loam, rarely flooded
Im1	Inavale fine sandy loam, somewhat poorly drained, 0 to 2 percent slopes, rarely flooded
If	Inavale fine sand, 0 to 2 percent slopes
Ia	Inavale fine sand, rarely flooded
If1	Inavale fine sand, somewhat poorly drained, 0 to 2 percent slopes, rarely flooded
Ih	Inavale loamy fine sand, 0 to 2 percent slopes
Ie	Inavale loamy fine sand, rarely flooded
Ih1	Inavale loamy fine sand, somewhat poorly drained, 0 to 2 percent slopes, rarely flooded
Et	Eltree silt loam, 0 to 2 percent slopes
EtC	Eltree silt loam, 2 to 6 percent slopes
BvG	Bristow silty clay, 30 to 60 percent slopes
LbD	Labu silty clay, 6 to 11 percent slopes
LcF	Labu-Sansarc complex, 11 to 30 percent slopes
LyF	Lynch-Bristow complex, 11 to 30 percent slopes
LzD	Lynch-Verdel complex, 6 to 11 percent slopes

MbF	Mariaville very fine sandy loam, 3 to 30 percent slopes
MeB	Meadin sandy loam, 0 to 3 percent slopes
MgF	Meadin-O'Neill complex, 3 to 30 percent slopes
Oe	O'Neill sandy loam, 0 to 2 percent slopes
OeC	O'Neill sandy loam, 2 to 6 percent slopes
Ph	Paka loam, 0 to 2 percent slopes
PhC	Paka loam, 2 to 6 percent slopes
PhD	Paka loam, 6 to 11 percent slopes
PhE	Paka loam, 11 to 15 percent slopes
SaG	Sansarc silty clay, 30 to 60 percent slopes
Ve	Verdel silty clay, 0 to 2 percent slopes
Vr	Verdel silty clay, 0 to 2 percent slopes
Ve2	Verdel silty clay, poorly drained, 0 to 2 percent slopes
Ve1	Verdel silty clay, somewhat poorly drained, 0 to 2 percent slopes
VeC	Verdel silty clay, 2 to 6 percent slopes
VeD	Verdel silty clay, 6 to 11 percent slopes
VfF	Verdigre fine sandy loam, 11 to 30 percent slopes
VfC	Verdigre fine sandy loam, 2 to 6 percent slopes
VfD	Verdigre fine sandy loam, 6 to 11 percent slopes
VgC	Verdigre loam, 2 to 6 percent slopes
VgD	Verdigre loam, 6 to 11 percent slopes
VgF	Verdigre loam, 11 to 30 percent slopes
LhC2	Longford silty clay loam, 2 to 6 percent slopes, eroded
Hd	Hobbs silt loam, 0 to 2 percent slopes
Sw	Solomon silty clay, 0 to 2 percent slopes
KzB	Kezan silt loam, channeled, 0 to 2 percent slopes
Ke	Kezan silt loam, 0 to 2 percent slopes
Kn	Kezan silt loam, occasionally flooded
Kef	Kezan silt loam, poorly drained, 0 to 2 percent slopes, frequently flooded
By	Butler silt loam, 0 to 2 percent slopes
Sc	Scott silt loam, 0 to 1 percent slopes
So	Solomon silty clay, rarely flooded
Fm	Fillmore silt loam, 0 to 1 percent slopes
LhD2	Longford silty clay loam, 6 to 11 percent slopes, eroded
Og	Ord fine sandy loam, 0 to 2 percent slopes
Of	Ord fine sandy loam, occasionally flooded
Oh	Ord loam, 0 to 2 percent slopes
Ok	Ord loam, occasionally flooded
Oh2	Ord loam, poorly drained, 0 to 2 percent slopes, occasionally flooded
Eh	Elsmere fine sandy loam, 0 to 2 percent slopes
Em	Elsmere fine sandy loam, rarely flooded
Ef	Elsmere loamy fine sand, 0 to 2 percent slopes
VaD	Valentine fine sand, 3 to 9 percent slopes
VaE	Valentine fine sand, 9 to 24 percent slopes
BoE2	Betts clay loam, 11 to 15 percent slopes, eroded
BoF	Betts clay loam, 15 to 30 percent slopes
BoG	Betts clay loam, 30 to 60 percent slopes
BoD2	Betts clay loam, 6 to 11 percent slopes, eroded

	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ao	Aowa silt loam, 0 to 2 percent slopes
Aw	Aowa silt loam, occasionally flooded
Ao2f	Aowa silt loam, poorly drained, 0 to 2 percent slopes, frequently flooded
Ao2	Aowa silt loam, poorly drained, 0 to 2 percent slopes, occasionally flooded
Ao1	Aowa silt loam, somewhat poorly drained, 0 to 2 percent slopes, occasionally flooded
Ar	Aowa silt loam, channeled, 0 to 2 percent slopes
As	Aowa silt loam, channeled, frequently flooded
Ar2	Aowa silt loam, poorly drained, channeled, 0 to 2 percent slopes, frequently flooded
Ba	Barney loam, 0 to 2 percent slopes
Bb	Barney loam, frequently flooded
Co	Coleridge silt loam, 0 to 2 percent slopes
Cp	Coleridge silt loam, occasionally flooded
Mk	Meckling loamy fine sand, occasionally flooded
Nw	Norway loamy fine sand, frequently flooded
Oc	Obert silt loam, occasionally flooded
Obf	Obert silt loam, very poorly drained, 0 to 2 percent slopes, frequently flooded
Ob	Obert silt loam, wet, 0 to 2 percent slopes
Ou	Orwet loam, 0 to 2 percent slopes
Ow	Orwet loam, rarely flooded
Sh	Shell silt loam, 0 to 2 percent slopes
Se	Shell silt loam, occasionally flooded
Sh1	Shell silt loam, somewhat poorly drained, 0 to 2 percent slopes, occasionally flooded
Iw	Inglewood loamy fine sand, rarely flooded
Bn	Bazile loam, 0 to 2 percent slopes
Bp	Blendon fine sandy loam, 0 to 2 percent slopes
Lk	Loretto fine sandy loam, 0 to 2 percent slopes
SdD	Sardak loamy fine sand, 2 to 9 percent slopes
ToB	Thurman fine sandy loam, 0 to 3 percent slopes
Tr	Trent silt loam, 0 to 2 percent slopes
Tx	Trent silt loam, moderately wet, 0 to 2 percent slopes
Or	Ortello fine sandy loam, 0 to 2 percent slopes
AcC	Alcester silt loam, 2 to 6 percent slopes
AcD	Alcester silt loam, 6 to 11 percent slopes
BnC	Bazile loam, 2 to 6 percent slopes
BnD	Bazile loam, 6 to 11 percent slopes
Bd	Bazile loamy fine sand, 0 to 2 percent slopes
BdC	Bazile loamy fine sand, 2 to 6 percent slopes
BdD	Bazile loamy fine sand, 6 to 11 percent slopes
Bt	Boelus loamy sand, 0 to 2 percent slopes
BtC	Boelus loamy sand, 2 to 6 percent slopes
BtD	Boelus loamy sand, 6 to 11 percent slopes
BwD	Brunswick fine sandy loam, 6 to 11 percent slopes
BxE	Brunswick-Paka complex, 6 to 15 percent slopes
BxF	Brunswick-Paka complex, 15 to 30 percent slopes
CtE2	Crofton-Thurman complex, 11 to 15 percent slopes, eroded
CtF	Crofton-Thurman complex, 15 to 30 percent slopes
CtD2	Crofton-Thurman complex, 6 to 11 percent slopes, eroded

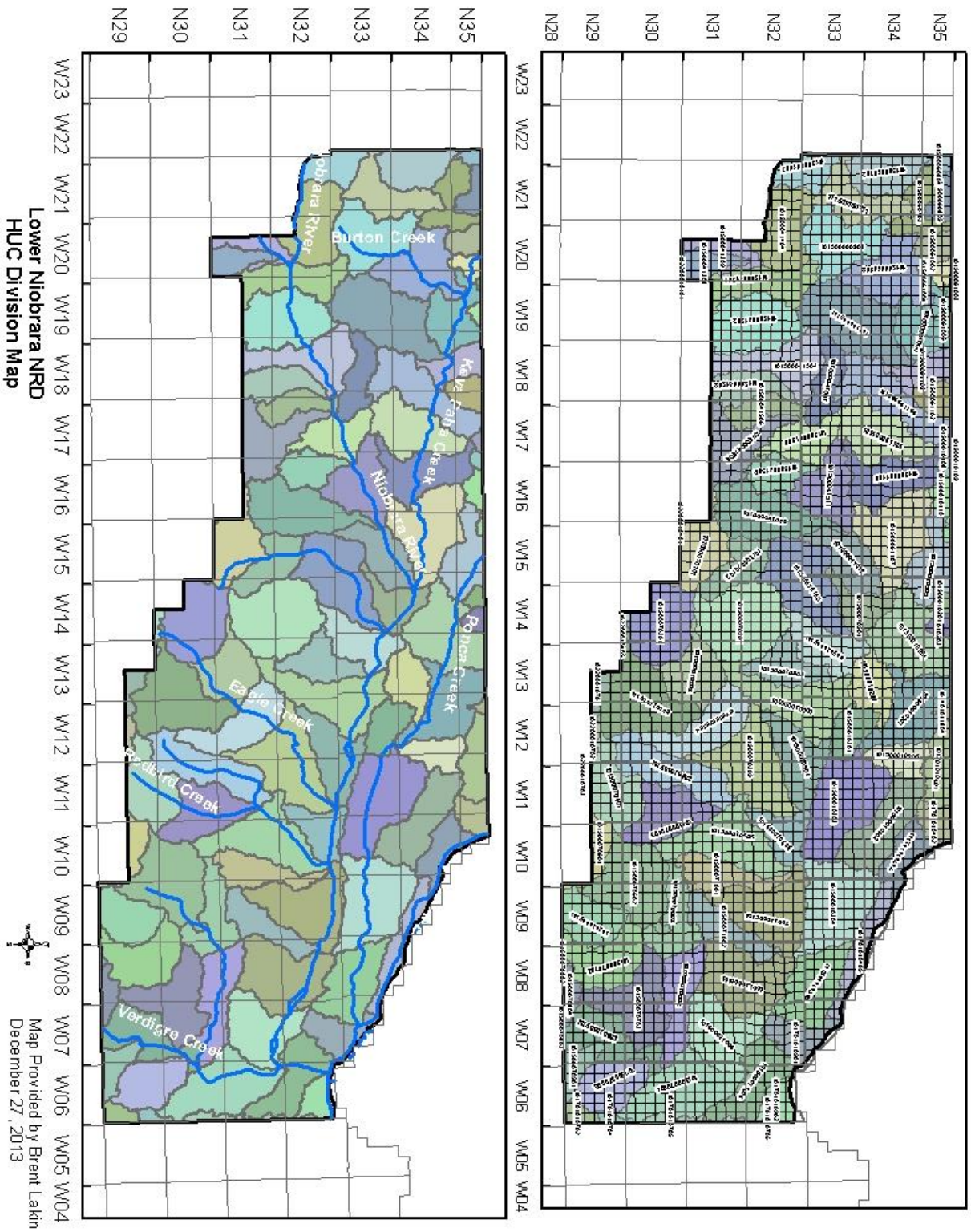
CrE2	Crofton silt loam, 11 to 15 percent slopes, eroded
CrF	Crofton silt loam, 15 to 30 percent slopes
CrC2	Crofton silt loam, 2 to 6 percent slopes, eroded
CrG	Crofton silt loam, 30 to 60 percent slopes
CrD2	Crofton silt loam, 6 to 11 percent slopes, eroded
CsC2	Crofton-Nora complex, 2 to 6 percent slopes, eroded
CsD2	Crofton-Nora complex, 6 to 11 percent slopes, eroded
	This map unit was added to the soil survey from an adjacent county for joining purposes.
ThB	Thurman loamy fine sand, 0 to 3 percent slopes
ThC	Thurman loamy fine sand, 3 to 6 percent slopes
TfB	Thurman fine sand, 0 to 3 percent slopes
TfC	Thurman fine sand, 3 to 6 percent slopes
ToF	Thurman fine sandy loam, 11 to 30 percent slopes
ToD	Thurman fine sandy loam, 3 to 11 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
NoE	Nora silty clay loam, 11 to 15 percent slopes
GaG	Gavins silt loam, 30 to 60 percent slopes
NoC	Nora silty clay loam, 2 to 6 percent slopes
NoD	Nora silty clay loam, 6 to 11 percent slopes
CsE2	Crofton-Nora complex, 11 to 15 percent slopes, eroded
LkC	Loretto fine sandy loam, 2 to 6 percent slopes
Mm	Moody loam, 0 to 2 percent slopes
MmC	Moody loam, 2 to 6 percent slopes
Mo	Moody silty clay loam, 0 to 2 percent slopes
MoC	Moody silty clay loam, 2 to 6 percent slopes
RdD	Redstoe silt loam, 6 to 11 percent slopes
RgF	Redstoe-Gavins complex, 11 to 30 percent slopes
OrC	Ortello fine sandy loam, 2 to 6 percent slopes
Aa	Albaton silty clay, 0 to 2 percent slopes
At	Albaton silty clay, occasionally flooded
Ab	Albaton silty clay, ponded, 0 to 1 percent slopes
An	Albaton silty clay, ponded, frequently flooded
Br	Blyburg silt loam, 0 to 2 percent slopes
Br2	Blyburg silt loam, poorly drained, 0 to 2 percent slope, occasionally flooded
Bg	Blyburg silt loam, rarely flooded
Br1	Blyburg silt loam, somewhat poorly drained, 0 to 2 percent slopes, rarely flooded
Pt	Percival silty clay, 0 to 2 percent slopes
Pv	Percival silty clay, rarely flooded
Od	Onawa silty clay, 0 to 2 percent slopes
Od2	Onawa silty clay, poorly drained, 0 to 2 percent slopes, rarely flooded
On	Onawa silty clay, rarely flooded
Bs	Boel loamy fine sand, 0 to 2 percent slopes
Be	Boel loamy fine sand, occasionally flooded
Bs2	Boel loamy fine sand, poorly drained, 0 to 2 percent slopes, occasionally flooded
Gf	Gibbon silt loam, 0 to 2 percent slopes
Gb	Gibbon silt loam, occasionally flooded
Gf2f	Gibbon silt loam, poorly drained, 0 to 2 percent slopes, frequently flooded
Gf2	Gibbon silt loam, poorly drained, 0 to 2 percent slopes, occasionally flooded

Gf3	Gibbon silt loam, very poorly drained, 0 to 2 percent slopes, occasionally flooded
Ho	Hord silt loam, 0 to 2 percent slopes
Hr	Hord silt loam, 0 to 2 percent slopes
StC	Simeon loamy sand, 0 to 6 percent slopes
SsF2	Simeon sand, 6 to 30 percent slopes, eroded
SuC	Simeon sandy loam, 0 to 6 percent slopes
SvF	Simeon-Thurman complex, 6 to 30 percent slopes
UbF	Urban land, 3 to 30 percent slopes
Ft	Fluvaquents, frequently flooded
Fu	Fluvaquents, silty, 0 to 2 percent slopes
LD	Sanitary Landfill
GP	Gravel Pits
M-W	Miscellaneous Water, Sewage Lagoons
W	Water
zw	Water, undifferentiated
	This map unit was added to the soil survey from an adjacent county for joining purposes.
JsB	Jansen loamy sand, 0 to 3 percent slopes
LcG	Labu-Sansarc silty clays, 11 to 40 percent slopes
MeB	Meadin sandy loam, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Oe	O'Neill sandy loam, 0 to 2 percent slopes
OeC	O'Neill sandy loam, 2 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
OhD	O'Neill-Meadin sandy loams, 6 to 11 percent slopes
WeC	Wewela fine sandy loam, 2 to 6 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Or	Ord loam, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
LfB	Libory loamy fine sand, 0 to 3 percent slopes
DuB	Dunday loamy fine sand, 0 to 3 percent slopes
Eo	Els loamy sand, 0 to 2 percent slopes
EpB	Els-Ipage complex, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
ErC	Els-Ipage-Tryon loamy sands, 0 to 6 percent slopes
Es	Elsmere loamy fine sand, 0 to 2 percent slopes
ExB	Elsmere-Selia loamy fine sands, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
IgB	Ipage loamy sand, 0 to 3 percent slopes
Lo	Loup fine sandy loam, 0 to 2 percent slopes
Lp	Loup fine sandy loam, wet, 0 to 2 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Ma	Marlake loamy fine sand, 0 to 1 percent slopes
TdG	Tassel-Valentine-Duda complex, 15 to 70 percent slopes
PtB	Pivot loamy sand, 0 to 3 percent slopes
PvD	Pivot-Valentine complex, 0 to 9 percent slopes

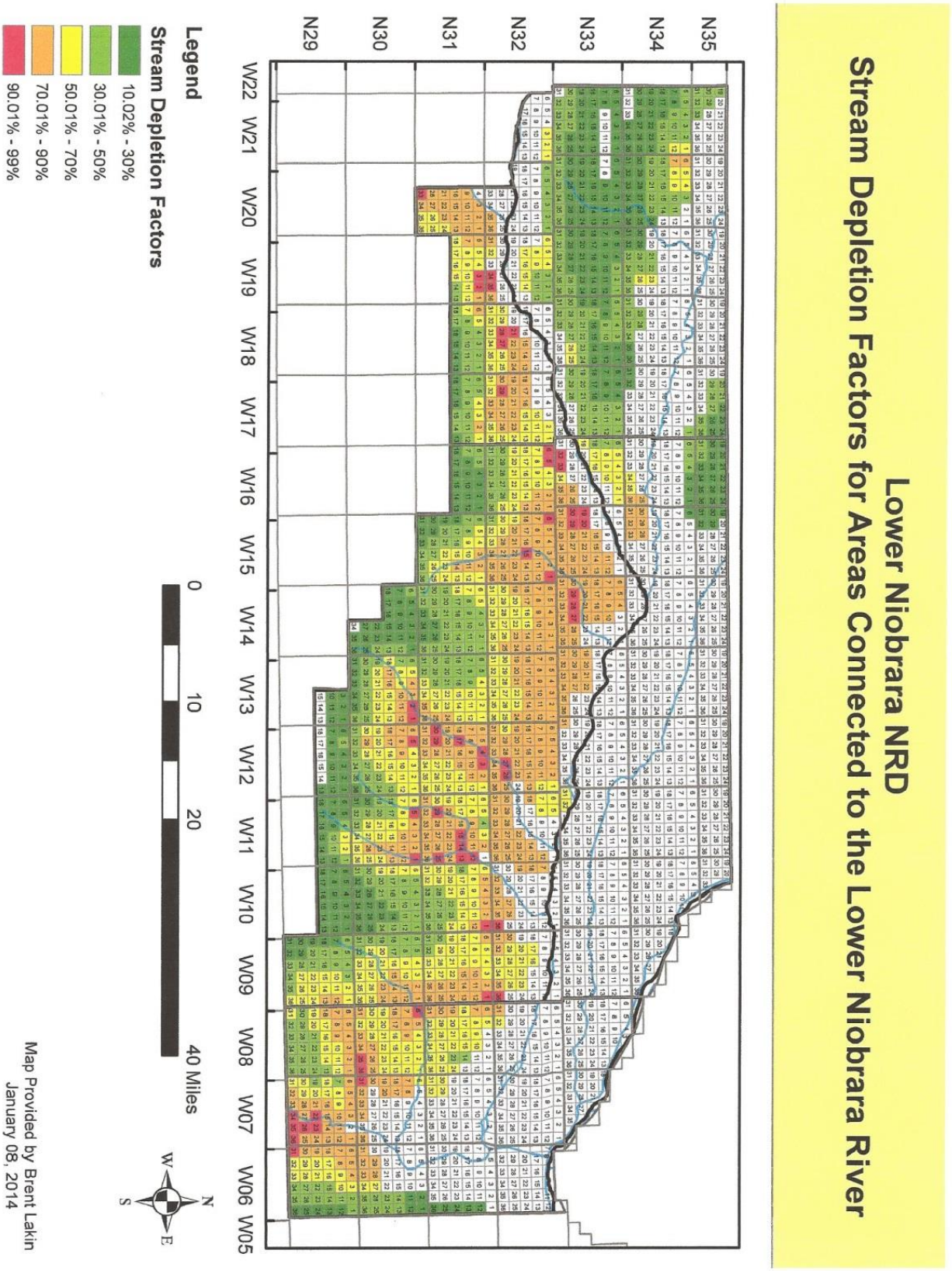
	This map unit was added to the soil survey from an adjacent county for joining purposes.
Tn	Tryon loamy fine sand, 0 to 2 percent slopes
To	Tryon loamy fine sand, wet, 0 to 2 percent slopes
TpB	Tryon-Els loamy sands, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VaB	Valentine fine sand, 0 to 3 percent slopes
VaD	Valentine fine sand, 3 to 9 percent slopes
VaE	Valentine fine sand, rolling
VaG	Valentine fine sand, rolling and hilly
VbB	Valentine loamy fine sand, 0 to 3 percent slopes
VbD	Valentine loamy fine sand, 3 to 9 percent slopes
VdD	Valentine-Boelus fine sands, 0 to 9 percent slopes
VfD	Valentine-Els fine sands, 0 to 9 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
	This map unit was added to the soil survey from an adjacent county for joining purposes.
VoB	Vetal loam, 1 to 3 percent slopes
Ba	Barney-Boel complex, channeled
BpB	Boelus loamy sand, 0 to 3 percent slopes
BtF	Brunswick-Tassel fine sandy loams, 11 to 40 percent slopes
BrD	Brunswick-Tassel loamy sands, 3 to 11 percent slopes
Bm	Boel loamy fine sand, 0 to 2 percent slopes
SkB	Simeon loamy sand, 0 to 3 percent slopes
	This map unit was added to the soil survey from an adjacent county for joining purposes.
SmD	Simeon-Meadin complex, 0 to 9 percent slopes
SvG2	Simeon-Valentine sands, 9 to 60 percent slopes, eroded
LD	Sanitary landfill
GP	Gravel pit
M-W	Miscellaneous water, sewage lagoons
W	Water
zwa	Water > 40 acres

APPENDIX 8: – HYDROGEOLOGIC UNIT CODE MAP OF DISTRICT

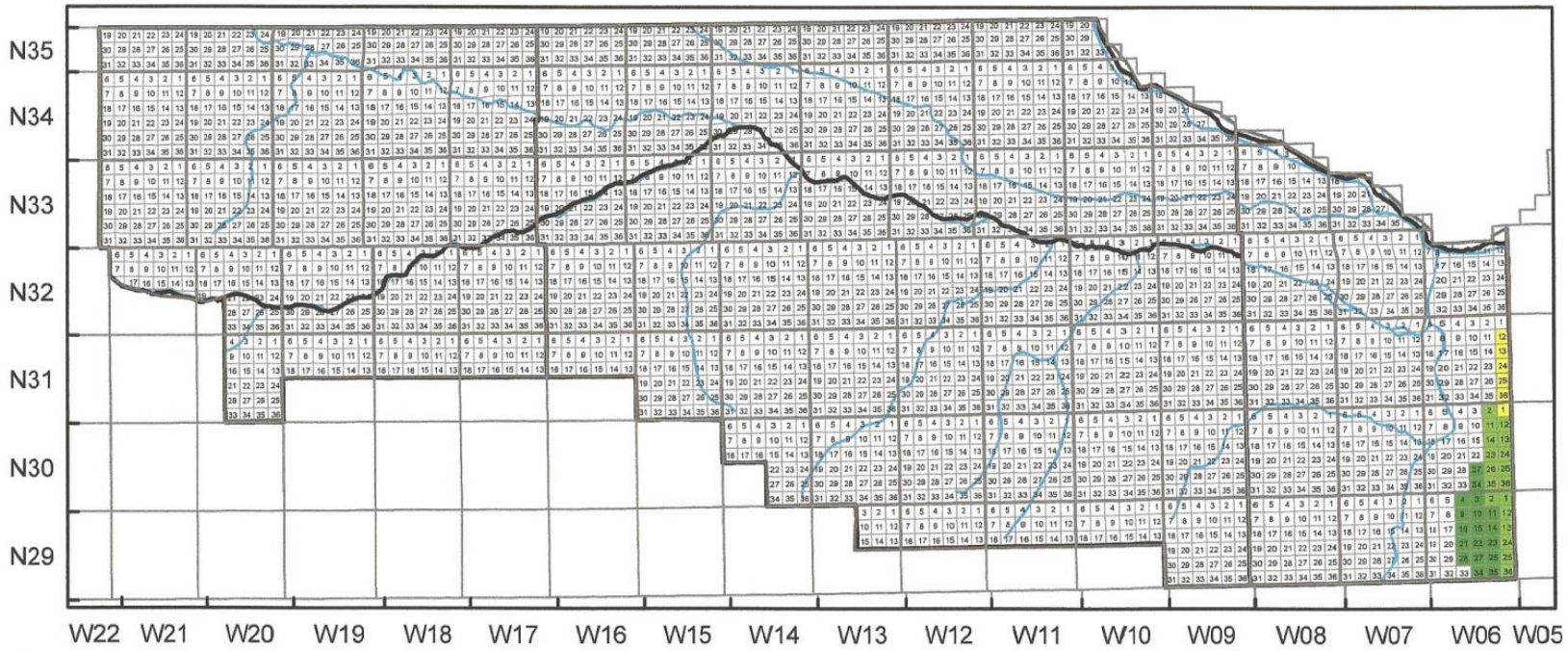
These maps establish the areas in which groundwater can be transferred. Groundwater cannot be transferred out of a given Hydrogeologic Unit.



APPENDIX 9: – STREAM DEPLETION MAPS OF THE DISTRICT



Lower Niobrara NRD
Stream Depletion Factors for Areas Connected to the Bazile Creek



Legend

bazile_sdf

Weighted_A

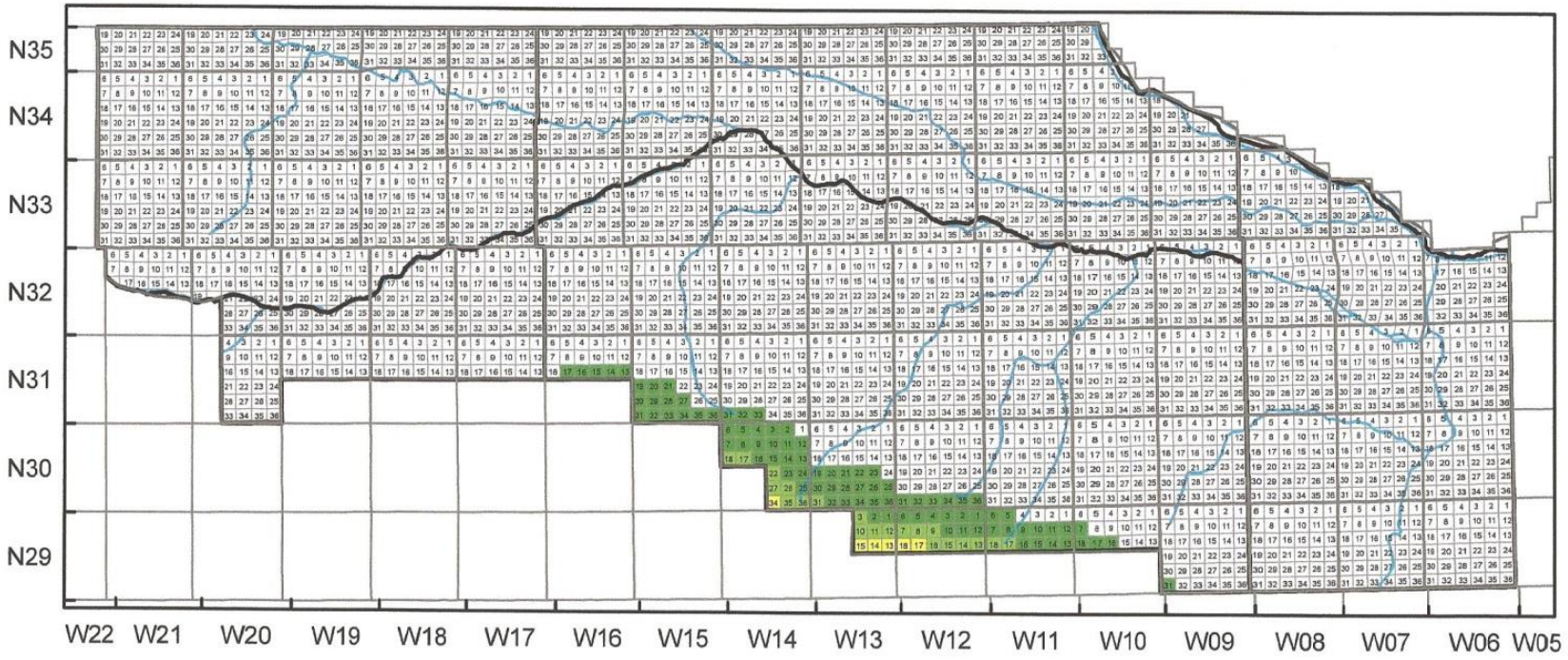
- 10.32% - 30%
- 30.01% - 50%
- 50.01% - 70%
- 70.01% - 90%
- 90.01% - 99%

0 10 20 40 Miles

N
W E
S

Map Provided by Brent Lakin
January 08, 2014

Lower Niobrara NRD
Stream Depletion Factors for Areas Connected to the Lower Platte River Basin



Legend

Elkhorn River Stream Depletion Factors

- 10.01% - 30%
- 30.01% - 50%
- 50.01% - 70%
- 70.01% - 90%
- 90.01% - 99%

0 10 20 40 Miles

N
W E
S

Map Provided by Brent Lakin
January 08, 2014